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QUEENSLAND AGRICULTURAL JOURNAL

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Event and Comment.

The Queensland Sugar Industry.—The Facts Restated.

THE Commonwealth Trade and Customs Department has performed a timely and valuable service to the sugar industry by its recently published examination of the whole sugar position. Its restatement of the facts should be convincing enough for the most economically minded member of the Victorian Housewives' Association, and should remove all doubts as to the wisdom of the present Federal sugar policy. Under that policy only wholesale and manufacturing prices have been fixed, but the wholesale rates are so based as to allow of refined sugar being obtained in every State capital, at a retail price of 4½d. a pound. To wholesale houses the price is £37 6s. 8d., less 2 per cent. discount for cash, and to retailers and housewives the price is the same, without the discount, for more than half-ton lots. Home manufacturers pay £36 11s. 9d. net cash; a special concession is given to fruit processors who pay only £30 6s. 8d. a ton. Under another special provision mill whites are supplied at £33 3s. 9d. a ton cash to retail grocers and housewives for any quantity in excess of half a ton which is the minimum; and £32 10s. 6d. to wholesalers and manufacturers.

The special price to fruit and jam canners has reduced, it is contended, their annual manufacturing costs by over £180,000. Besides stimulating sales, this reduction in factory costs has also been of material assistance to orchardists by increasing the demand for their fresh fruit. Manufacturers, under this arrangement, have also been placed in at least as good a position as regards sugar costs as they would occupy were there no embargo. Then again, an export rebate of ordinary

home consumption prices is given; and these rebates have varied between £80,000 and £109,000 a year, and are fixed by the Export Sugar Committee which is representative of the three interests concerned—the sugar industry which pays the rebates, the manufacturers for export who buy the sugar and receive the rebates, and the Government.

Why the Industry is Protected.

THE chief reasons given for this particular form of protection to the sugar industry are:—(1) World's sugar prices have always been subject to considerable fluctuations, which would cause great difficulty in establishing a fixed rate of duty which would at all times be fair to both producer and consumer. A fixed rate would sometimes give the sugar industry excessive profits at the expense of the consumer, and at other times insufficient profits, or, perhaps, losses, that would seriously injure the industry. Moreover, the constantly fluctuating home consumption price would be more or less embarrassing to manufacturers using sugar in a large way.

(2) After many years' experience, the industry has been found to be the only one capable of establishment on a large scale in the vulnerable coastal districts of the North. Consider, in illustration of this, that from Townsville north there is a population, within a fairly small area along the coast, of approximately 100,000, whereas in the Northern Territory, in approximately the same latitude, the population is only about 3,000. The White Australia policy is intimately bound up with the sugar industry.

(3) If Australia were to import her sugar from abroad, something between £4,000,000 and £5,000,000 a year would be paid to countries where the balance of trade is already substantially against Australia.

(4) The sugar industry pays over £6,000,000 a year in wages, and has created a very large trade with Southern States in manufactured goods of all descriptions.

(5) Sugar production has entirely changed since the kanaka days. A large proportion of the sugar was then produced under the plantation system with numerous large holdings. To-day there are over 8,000 individual farmers engaged in the industry, cultivating an average of 37 acres each and only seven or eight plantations still remain. This has resulted in an intense form of closer settlement which has great advantages both economically and socially.

Since Government control started in 1915 the acreage under production has increased from 173,000 to 284,000, and the number of direct employees from 16,700 to 30,000, while employment is, of course, provided indirectly for many thousands more.

Practical Co-operation.

IT is all very well talking to the farmer, or perhaps talking at him, about the need of adopting modern methods and using up-to-date machinery on his holding if he has not the wherewithal to do it. There are many farmers (good men, too) who, starting without sufficient capital, are struggling on towards that happy day when they can go to the machinery merchant with every confidence to buy and pay for the power to lighten their labour and for which they have longed for years. They realise, none better, the necessity of reducing the costs of production, but the simple fact is they cannot afford the extra and necessary plant. Still, if there is a way out at all they will never be stuck. That is the case with some canegrowers at Bli Bli in the Nambour district. A few of them got together

and formed a syndicate for the purchase of a tractor and a rotary hoe. They went into the matter on a business basis and these modern machines have scarcely been idle a day since their purchase. A charge of 12s. 6d. an acre is made to all users, and where an area cannot be conveniently measured an hourly rental rate is imposed. The machines are available also to non-shareholders who quite fairly are asked to pay a larger fee, £1 per acre being the usual amount, and the machines are used as much by these farmers as by the co-operators. The saving of labour and time means money earned and this fact the farmers are realising in a very convincing way, and the general lament is that this co-operative plan was not put into practice long ago. It has been found, for instance, that on old cane land the rotary hoe can cover 5 acres in the eight-hour working day. It is also used largely in ratooning. By the simple plan of removing the middle bar a row can be straddled and the soil thoroughly stirred alongside the stools on each side. It is now proposed to add a double disc plough to the plant and a saw bench fitment for cutting firewood to the tractor. The present difficulty of the co-operating owners is to satisfy all the demands on their small plant, and this will no doubt lead to its duplication, or even its multiplication, which will be to the benefit of the cane-growers and other farmers in the district. As a case of practical co-operation it is to be commended, especially in districts in which, generally, crops or holdings are too small to justify the individual purchase of expensive machinery. The advantages of power farming on suitable land are so obvious that the small holder will welcome an opportunity to employ it without losing an hour's sleep in wondering how he is going to get over the initial financial hurdle.

Sugar and Pineapples.

ON some of the drained swamp lands round about Bli Bli excellent crops of cane are growing, and this on country that on account of its waterlogged state was formerly regarded as useless except for the game with which it abounded. The crop that it is at present carrying is the best evidence of the soundness of the judgment of those who saw its possibilities once it was drained. Some good crops have been taken off it, and the returns over a series of seasons have quite justified the faith of those who first realised its value and persevered with their plans for bringing it into profitable production. Cane cultivation has been well seconded with pineapple growing, and the local "gardens" have already won a reputation for the flavour and sugar content of their fruit. Large areas are now under crop and some farmers are combining the two crops to their financial advantage, which will continue so long as there is a stabilised market. Paper mulching is used to some extent, and this practice is a great labour-saver as well as a crop insurance. Anybody who has had to live laborious days on a pineapple farm will appreciate anything that will keep the weeds down, and paper mulch does this very effectively. Not only that, but it conserves moisture, and greatly reduces the possibilities of disease. There is another point about paper and that is where fertiliser is used it is reserved for the actual crop and is not exhausted by wet season weeds. For pineapple growing paper mulch is becoming to be regarded as indispensable, and wherever the long parallel strips are seen there you will find orderly fields, quite free from soil-robbing "sports" of every description. At Bli Bli there is a farm on which sugar and pineapple growing are economically combined; and on this holding agricultural standards are high in every department and the condition of the crops and the general layout and obvious intelligent management of the place are all expressive of what is meant by sound field practice the value of which, it is certain, is reflected in crop and market returns.

THE HON. HARRY F. WALKER.

NEW MINISTER FOR AGRICULTURE AND STOCK.

The Hon. Harry F. Walker, Minister for Agriculture and Stock in the new Queensland Government, was born at Gympie on 15th April, 1873. All his early life was lived on the goldfield that has contributed so much to Queensland's progress. He was educated at the One-mile and Monkland State Schools and afterwards at a private Grammar School.

As a young man mining naturally attracted him, and for twelve years he was engaged actively in that industry, both on top and underground. Mr. Walker saw the transition of his native district from one of the most profitable gold-producing provinces to one of the richest and most progressive dairying regions in Australia. In 1910 he acquired a considerable area of land near Gympie and entered into diversified farming in which he has been very successful, particularly in dairying which is his main interest.

Mr. Walker was first elected to Parliament as the representative of Wide Bay in 1907, and has held a seat in the Legislative Assembly ever since. On the redistribution and renaming of electorates some years ago he contested Cooroora, a district on the near North Coast, and had no difficulty in securing the representation of that important rural constituency. His valuable services, Parliamentary and otherwise, to the agricultural and stock raising industries have been recognised by his return without opposition at several successive elections.

Twenty-three years ago, in association with a few other progressive dairy farmers, Mr. Walker assisted very materially in the organisation and establishment of the Wide Bay Co-operative Dairy Company, of which he has been Chairman of Directors for a number of years, besides being a director ever since its inception. This company controls two large modern butter manufacturing plants at Gympie and Cooroy. Its Gympie factory is one of the largest and most complete in the Commonwealth, and in the quality of its output has achieved an enviable reputation on home and oversea markets.

The co-operative movement in Queensland has had in Mr. Walker an ardent, long-sighted and very practical advocate. His interest in dairying particularly led him in 1924 to investigate personally manufacturing methods and marketing systems in Great Britain. This investigation was extended to the Continent and its results have already proved of benefit to the industry in this State, especially on its selling side. While abroad Mr. Walker was also a close observer of agricultural conditions in Europe. He made a special on-the-spot study of Danish dairying organisation and marketing methods, and on his return home contributed a valuable series of Press articles, in which comparisons were often in favour of Queensland, and which added very considerably to our knowledge of present-day dairying practice.

In his day he was a noted athlete and horseman. A supporter of the volunteer movement he joined the Queensland Mounted Infantry which was later to win renown on South African battlefields, and was among the picked body of men chosen to represent Queensland at Queen Victoria's Diamond Jubilee Celebrations in England in 1897. With other Gympie young men who have since loomed large in our public, commercial, and industrial life, including Major-General Senator Sir William Glasgow, the Federal Minister for Defence, Mr. Walker joined the first Queensland contingent accepted for service in the last Boer war. He was with his regiment in every engagement, including Sanna's Post where he won distinction. until he was invalided home.

In his youth the new Minister excelled as an exponent of military sports and figured with success in international tournaments in England at which Queensland Mounted Infantrymen competed, as well as in the Light Horse tournaments at Lytton in the old volunteer days.

Mr. Walker's home is at Tewantin, on the near North Coast, and in the centre of our beautiful lake country. In hours of limited leisure he finds recreation in shooting and fishing in a countryside abounding in native game.

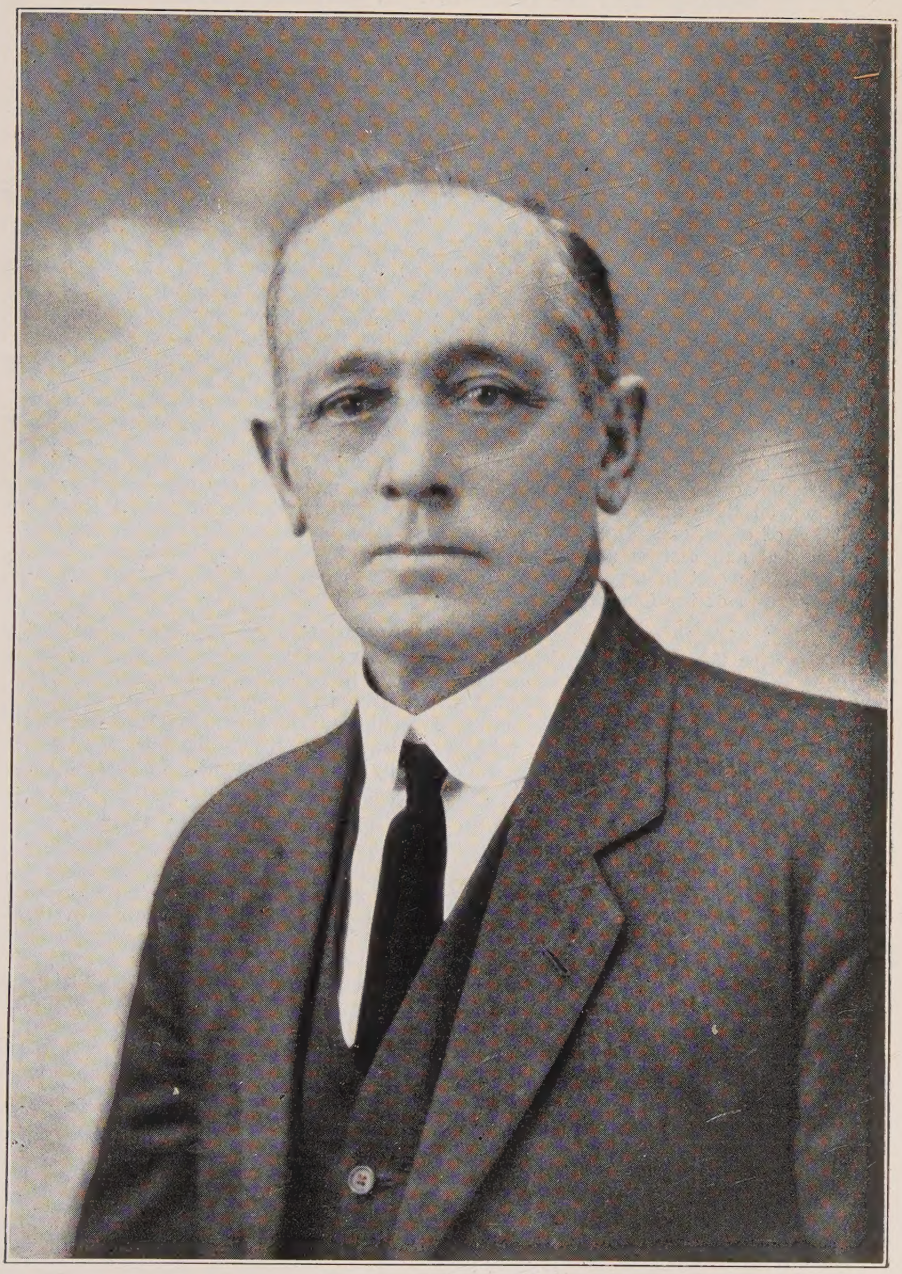


PLATE 106.—HON. H. F. WALKER, MINISTER FOR AGRICULTURE AND STOCK.

VALEDICTORY.

RETIREMENT OF THE HON. W. FORGAN SMITH.

The Hon. W. Forgan Smith, the retiring Minister for Agriculture and Stock, invited the whole of the staff of the Department to meet him in his room on the eve of his relinquishing office for the purpose of bidding them farewell.

Mr. Forgan Smith said that he was very pleased to see so many of his former staff present. He wanted to take that opportunity of thanking them for the very faithful and loyal service they had given him as their Minister. He was about to take his departure from the Department, and he wanted to assure them that he would continue to take a very keen interest in their welfare and their activities in the service of the agricultural industry. He considered that the Department of Agriculture and Stock was the most important in the State, and it was very pleasing indeed to observe that on his recent election tour that there was everywhere appreciation and praise of the Department and its officers. There was a very healthy feeling between the Department and the men on the land, and that co-operation was something that he had always endeavoured to foster. In the development of Queensland agriculture the officers of the Department would continue to play an increasingly important part. The resources and personnel of the Department had been built up with that fact in mind, and its staff, laboratories, and other equipment compared most favourably with those of every other State. Continuing, he added—

"Your sphere of utility to the State is one that is worth while. The provision of a nation's food supply and the elements that go to provide for a people's needs all depend on their agricultural resources and what use is made of them. During my period of office, extending a little over four years, much beneficial legislation has been enacted and certain sound developments have taken place. That, of course, has resulted in certain organisations being built up, which I think will be a permanent feature of the life of the State.

"I just wish to express my very hearty appreciation of the very loyal and efficient service that has at all times been given me as the Ministerial head of the Department, and I feel that loyalty and service will be extended to my successor and to whichever Government is in power. I will continue to take a very keen interest in the work you are doing, and, finally, I would advise the Department in its administration never to allow any other organisation to usurp the functions and activities that could only properly be exercised by the Department. (Applause.)

The Under Secretary, Mr. E. Graham, on behalf of his fellow officers of the Department, thanked Mr. Forgan Smith for asking them to meet him on the eve of his severance with the Department. They appreciated very sincerely the laudable references their former Minister had made to the officers of the Department. They knew that he had set efficiency as his standard, and the splendid example shown by himself as Minister and the keen interest he had taken in the work of his officers he (Mr. Graham) felt sure had had a very striking influence on their work. The fine example of efficiency and co-operation he had set had been reflected throughout the Department. Mr. Forgan Smith's association with them as Ministerial head had extended well over four years; that was a fairly long term for a Minister to remain in one Department, and though it might not be a record as far as time was concerned, he thought that it embraced a record of service to the agricultural industry that would be very difficult to equal. (Applause.)

As a mark of their esteem of Mr. Forgan Smith's sterling qualities, his fellow-officers had requested him to accept a small gift. That gift was also some little tangible evidence of their appreciation of him as a citizen who had taken a prominent place in the affairs of the nation, and also as a man. It was desired also that Mr. Smith should have some little reminder of his association with the Department and its officers. (Applause.)

Mr. Graham then presented to Mr. Forgan Smith a solid silver cigar box, suitably engraved, and a silver cigar cutter and holder.

Mr. Smith feelingly responded. He was leaving the Department, he said, with the heartiest good feeling towards every officer, and his interest in their work would increase rather than lessen with the passing of the years. (Applause.)

Mr. Smith then thanked each officer individually for services rendered to the Department while he was in control.

Bureau of Sugar Experiment Stations.

CANE PESTS AND DISEASES.

Mr. R. W. Mungomery, Assistant Entomologist, stationed at Bundaberg, has submitted the following report (27th May, 1929) to the Bureau of Sugar Experiment Stations:—

RAT DAMAGE IN CANEFIELDS.

Farmers, Beware of Rats.

It is now opportune to issue a note of warning to farmers to keep a keen watch for rats damaging their cane. Cases of destruction of maturing cane by rats have already occurred this season, and more are likely to be met with as the season advances. It is with the object of minimising damage and suppressing these pests that the following notes have been prepared.

Nature of Injury.

Rat attack can easily be recognised by the peculiar nature of the injury, since sticks are damaged by gnawing into the internodes and eating away the softer internal fibres, leaving portion of the hard rind and the nodes intact. Several internodes in succession may be eaten in this manner if the cane be particularly sweet and suitable, whilst at other times, and especially if the cane is immature, only one internode may be eaten into and abandoned. In such cases, these points of attack constitute points of weakness in the individual sticks, and the portions above the damaged part are readily snapped off when the first windy weather is experienced. In other cases, the top portion of the stick may dry out, and the bottom portion may send out a vigorous growth of shoots, thus directing growth into wrong channels. From this it will be apparent that the total loss involved by farmers through rat depredations amounts not solely to the cane actually eaten, but is represented by the total tonnage destroyed, which at times is considerable.

Where to Look for Damage.

Sweeter varieties of cane are more subject to attack than the poorer quality canes, and rats also show a decided preference for the canes with a soft rind; thus it is evident that damage is most likely to occur in sweet varieties possessing a soft rind. Most frequently rat attack commences on farms bordering or adjacent to river banks, creeks, and swamps, &c., where good supplies of grass and debris offer excellent shelter and breeding grounds for them. Uncultivated gullies in farm areas are usually sources from which rat invasion commences, and old standover cane which has become twisted and lies down is particularly attractive to rats, for, in addition to being provided with an adequate supply of food, they are also protected from the attacks of hawks, owls, and other birds of prey.

Control Measures.

To exterminate rats, consideration must first of all be given to the destruction of their shelter and breeding grounds. Grassy paddocks should be fired annually after the nearby cane crops have been harvested. Spaces intervening between blocks of cane should not be allowed to support a rank growth of grasses. Where, because of the uneven contour of the land, it is not possible to cultivate the whole of a farm, any such waste land might well be fenced off to serve as paddocks for stock.

When natural methods of control, such as have been enumerated above, have been carried out and rat damage still occurs, the use of poison baits as a means of lessening their numbers and abating the menace is to be recommended. The most successful and convenient bait to use is the Barium biscuit bait, which has been used with good results in the Mulgrave district in past years, and which likewise has proved effective in the Bundaberg district in the few instances in which it has been used. To obtain the utmost efficiency from such a method, it is essential that concerted action be taken by all growers affected, and if neighbouring growers co-operate when damage commences, much good will accrue, whereas the task is much more difficult for one grower to tackle single-handed. Especially is this so if he is confronted with the task of wiping out rats migrating from neighbouring properties where no system of control is being practised.

To make Barium biscuits, the following ingredients are required in the proportions set out hereunder:—

Barium carbonate	10¼ lb.
Flour	21¼ lb.
Pollard	4 lb.
Tallow	6 lb.
Salt	9½ oz.
Water	1 gallon.
Aniseed oil	½ oz.

Method of Mixing.

Sieve the Barium carbonate and break up all lumps, then mix this poison thoroughly with the pollard and flour in the dry state. Heat the tallow until melted, and then knead it into the flour-pollard-barium mixture. Dissolve the salt in about ¼ gallon of water and add this to the mass, working it thoroughly and adding the remainder of the water in small amounts as considered necessary, until an even dough is obtained which will just stick together. Roll this dough to a thickness of not more than ¼ inch on to trays, cut into pieces ½ by ½ inch and bake in a moderate oven until completely dry. Then mix the aniseed oil with an equal quantity of water and spray over the biscuits when they are cool. A small "Lotol" spray or similar device will serve excellently for this purpose. The bait is then ready for use. It is advisable to handle the biscuits as little as possible, and to rub oil of aniseed on the hands when distributing the bait in the fields.

This mixture is both cheap and effective, and has the further advantage of not being highly poisonous to stock, dogs, or human beings, although only a small portion of a biscuit is required to kill a rat. However, to guard against any cases of poisoning, it is advisable to scatter the baits in places inaccessible to stock, and to store the biscuits out of reach of children.

Barium carbonate may be purchased from Messrs. Taylors and Elliotts, Limited, 154 Charlotte street, Brisbane, and costs approximately 1s. 3d. per lb. The oil of aniseed can be procured from any chemist, whilst the other ingredients may be purchased from the local grocers and butchers.

Distributing the Bait.

In distributing the bait, the usual procedure is to scatter six biscuits every 5 yards along headlands, banks of creeks, &c., where rats are plentiful, and walk through the cane along every twentieth row distributing bait at the rate of six biscuits every 10 yards. This is only a rough guide, as no hard-and-fast rules can be laid down, and distribution of the bait will have to be carried out from a common-sense point of view. Thus, much will be left to the discretion of the person scattering the bait, and he should concentrate on those portions of the field where damage is showing up worst. Used in this manner, Barium biscuits have given excellent results as an effective rat poison, and those farmers who have once tried them are very enthusiastic concerning the benefits to be derived from this system of wholesale poisoning.

Following is a report (15th May, 1929) of the Division of Soils and Agriculture:—

EXPERIMENTAL PLOTS.

The major project of this division for the past quarter has been the initiation of the systematic farm experimental trials. The field officers have suspended temporarily their farm-to-farm inspections, and have spent their time in the selection of farms and farmers suitable for the work. The necessary preliminary arrangements for a number of autumn plantings were also put through, and we have to report that twelve trials have now been set out successfully in the Bundaberg and Mackay areas.

The growers on whose lands these trials are located are—

Southern District.

Gahn Brothers, Tantitha.
Qunaba Plantation, Bundaberg.
L. M. O. Lucas, Skyring's Reserve.
P. Petersen, Bingera.
A. Adie, Childers.
Burrage Brothers, Maroondan.

Mackay District.

J. Trevaskis, Farleigh.
H. Single, Foulden.
E. Evans, Richmond.
J. Gibson. Racecourse.
Alexandra Plantation, Palms.
Laws and Baker, North Eton.

Variety trials have also been set out on Windermere and Fairymead Plantations to test the value of certain promising Indian varieties, which were introduced during the past few years, against the standard canes of the area.

Growers are urged to follow the progress of those plots which have been set out on lands on which the soil type is similar to that on their own farms; for it is hoped the results obtained will be generally applicable on all lands of a similar type in the particular area.

The arrangements for the proposed trials in the Northern area are also well in hand, and, given favourable planting conditions, the laying-out of the plots will be pushed ahead.

The names of the farms on which trials have been set out will be published from time to time.

Supply of Fertilisers.

We are pleased to announce that the fertiliser distributing firms have displayed considerable interest in the farm trial project. In their desire to be of practical assistance in the work, they have placed at our disposal a quantity of fertiliser sufficient for the requirements of the sixty trials which we plan to set out this year. The fertiliser will then be passed on to the growers on whose land trials are located, in return for any added labour which the experimental trial may impose upon them.

Suggestions for Mackay Growers.

In the course of our field work in the Mackay district we have attempted to determine some of the problems which stand in the way of crop improvement; and we have prepared the following notes bearing on these questions, together with our proposals for a solution of these difficulties.

A study of the cane soils in the valley of the Pioneer River shows that they are, in general, of an alluvial nature. Along the river banks the deposits are of recent origin, and are consequently deep sandy loam soils. Now this "sand" is not altogether quartz sand, and under weathering conditions it decomposes to give a sandy clay—the "red clay" that is often spoken of in describing the older subsoils, which are developed at some distance from the river. The soils on the majority of the plain are from 8 to 16 inches in depth, and this variation in depth of surface soil is the feature which requires study in the intelligent cultivation of the soil.

In general, an "ironstone" layer is met with between the soil and the subsoil proper. This is only 1 or 2 inches thick, but is a most important factor in the welfare of the crop. This layer is generally "tight" and impervious to water. Our borings by means of a soil auger have shown that the subsoil beneath this pan may be quite dry, even after continuous rains, while the surface soil cannot be worked due to excessive water which cannot drain off.

Now it is well recognised that crop roots require a well-drained aerated soil if they are to function successfully. Hence the net effect of such a hard pan at a depth of but a few inches below the surface is to give a shallow soil which, without adequate surface drainage, readily becomes water-logged, and under dry conditions the plant is not able to draw on a supply of moisture which might be yielded by the subsoil.

The remedy is, then, to attempt to break up this hard-pan layer, and thus increase the depth of available soil. Where the soil is but 8 inches deep it is recommended that at each breaking of the land a little of the subsoil (say 1 inch) be brought up by the plough, and worked into the surface soil. In this way the layer will be destroyed, and the depth of soil gradually increased.

Where the hard pan occurs at a depth of 10 to 12 inches this method may not be practicable. In this case the use of the skeleton plough or subsoiler may be employed, and thus break up the layer to promote better drainage conditions and provide a ready passage for the roots into the subsoil.

Surface Drainage.

On many lands a system of adequate surface drainage is very desirable to hasten the removal of the surplus water which the land receives during the wet season, and thus aid in the restoration of soil conditions more suitable for the growing crop.

When making field waterways with the scoop the transported soil should be distributed evenly and back from the headlands, otherwise the field becomes basin shaped. Planting in beds would also aid materially under conditions of difficult drainage.

It is significant that many growers could advantageously cultivate smaller areas with more profitable results. Better and more timely cultivation would then be possible, and the crop would respond better to the cultural treatment, besides giving the full benefits to be derived from the use of fertiliser. Earthing-up to plant and ratoon cane is a practice too frequently abused.

Varieties.

Too many varieties are grown. A selection of four varieties should meet the requirements of 90 per cent. of the lands in this area, and all others should be discarded. We are aiming at assisting growers in this respect by laying out well-planned varietal trials under varying soil conditions.

Fertiliser Applications.

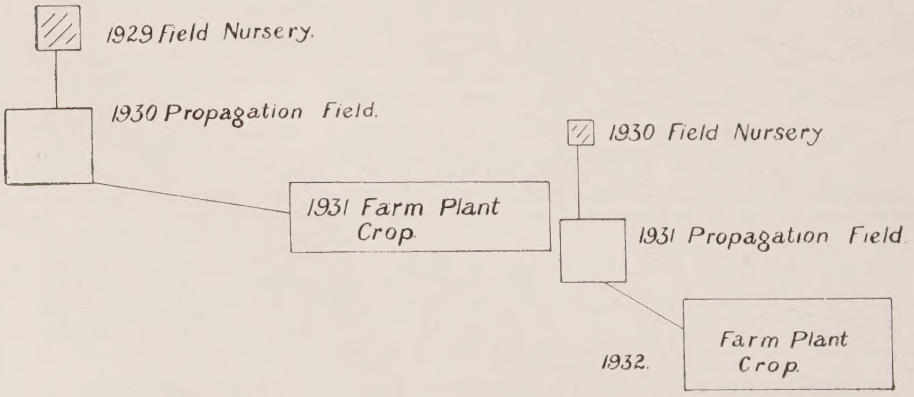
Every attempt should be made to stimulate vigorous crop growth early in its life. Early applications of fertiliser are a very valuable aid in this respect. It is recommended that at least a portion of the fertiliser be applied in the drill at planting, and the balance in a furrow made near the cane row, as soon as the crop is established. Sulphate of ammonia or nitrate of soda should be applied as a top dressing always.

With ratoons, all mixed fertiliser should be applied in the drill when cutting away from the stools; if practicable this should be done within two or three weeks of harvesting. Extra nitrogen applications in the form of sulphate of ammonia should be made as a top dressing six or eight weeks later.

Use of the Best Cane for Seed.

Only the best material should be used for planting. This has proven the soundest policy both in this country and elsewhere. A good plan has been devised on certain Hawaiian plantations, which might be adopted here. It aims at securing only sound and healthy material for plants. Selected seed is planted in a section called the field nursery. The cane cut from this plot is transferred the following year, after reselection, to the propagation or field seed plot. This field is ready in the following year to supply sound and healthy canes for farm planting purposes.

The process is repeated each year. The plan may be represented diagrammatically as follows:—



The area of land needed for this purpose would be quite small—the propagation field need not, in general, exceed 2 acres in extent—and growers could assure themselves of a ready supply of most suitable planting material.

FUTURE WORK OF THE DIVISION OF AGRICULTURE AND SOILS.

With the return of the three travelling research fellows from overseas recently, the Bureau has been reorganised in order to promote more efficient working amongst its different branches. Four divisions have now been created, each with an officer in charge, as follows:—

Division of Agriculture and Soils—Dr. H. W. Kerr, Chemist and Agriculturist.
Division of Pathology—Mr. A. F. Bell, Pathologist.
Division of Entomology—Mr. E. Jarvis, Entomologist.
Division of Sugar Technology—Mr. N. Bennett, Sugar Technologist.

The officer in charge of each division will work out his plan of campaign, in consultation with the Director, and direct the activities of the officers attached to his branch.

The future policy of the Division of Agriculture and Soils has been finalised recently, and it is felt that growers will be interested to learn of the nature of the investigations which are being carried out.

The ultimate aim and object of the Bureau must be to assist growers in reducing costs of production. Our Pathologists are endeavouring to instruct farmers in the identification of diseases, and in the control measures which they should adopt to obviate losses due to this cause. They are also attempting to secure new varieties, resistant to disease, and at present quite a number of foreign-bred seedlings are being grown, preparatory to disease-resistance trials. Under their supervision seedlings will also be raised in Queensland, with a view to securing superior disease-resistant varieties.

The Entomologists are studying the life histories and habits of insects of economic importance to the cane industry, and they, in turn, are seeking control measures to enable the checking of this form of wastage.

To the Agriculturists falls the task of demonstrating the best cultural methods to employ, of determining the fertiliser needs of our various soil types, and of the adequate testing of cane varieties to find out which are best suited to our various districts. In addition, the Experiment Stations will continue their field trial work and the propagation of varieties while this year the practice of seedling raising will be extended to the Mackay and Bundaberg Stations.

All seedlings are raised at present at South Johnstone, where conditions are so admirably suited to the securing of crosses between different varieties to produce new seedling canes. Conditions on our other two stations are not so satisfactory in this respect, so that it will be necessary to transfer arrows which have been produced at South Johnstone to each of the more southern stations. Here they will be planted out, and the resulting seedlings tested for their suitability under the particular conditions of those districts.

The major portion of the work of the Agricultural Division for some years to come must be, however, the laying down of suitable farm trials, in order to determine the fertiliser requirements of our important soil types. In the past, fertility trials have been confined to the Experiment Stations; but it is appreciated that the results obtained on these lands are quite limited in their application, and it is more desirable to secure our knowledge for the several soil types in any district by well conducted field trials on the lands of chosen farmers in that area.

Our experiences have taught us that much can be attained on our sugar lands by the use of the correct fertilisers applied at the right time and in appropriate amounts. This is the reason for our attaching so much importance to this phase of the work. It will be appreciated that, to carry on the work successfully, much careful supervision will be involved in the planning, laying out, making growth observations, and harvesting of these farm trial plots. For the coming planting season about fifty or sixty of these trials will be set out on selected areas throughout the Queensland sugar districts. It is our plan to extend this work from year to year, and as each trial must be carried through at least to the second ratoon crop there will be about 200 such trials under way within three or four years.

Our method is to inspect each district and select lands which are about to be planted, which carry soils representative of important types found in the area. A trial is then planned which should yield the maximum amount of useful information regarding the response to the important fertilising constituents either singly or combined. Results from such trials will afford us definite knowledge regarding the need for nitrogen, phosphoric acid, potash, &c., on that soil type. It will then be possible to give a trustworthy recommendation as to the proportions of the various constituents in a mixture best suited to the particular soil.

In selecting farmers for our purpose we have deliberately chosen, as far as possible, those men who are keen and appreciative of the value of this type of work, and who command, moreover, the confidence of their neighbours whose lands possess

soil of a similar type. It is thus hoped that the latter will be interested in watching the development of the trials and be convinced of the value of the results so obtained. The chosen grower is asked to supply the fertiliser required for the trial, but the added work of plot layout, supervision of harvesting, &c., will be taken in hand by our officers. The produce of each plot will be carefully weighed and analysed so that the true value of the treatments may be accurately determined. The co-operation of the various mills has been assured us with regard to the latter phase of the work.

As we are able to handle this year, on an average, only two trials in each mill district, it is appreciated that many growers who would willingly co-operate with us in this respect must be disappointed for the time being. But as the scope of the work will be extended from year to year, it is hoped that they will have an opportunity, at a later date, of having trials set out on their farms.

For the present the trials will be confined to a determination of the fertiliser requirements of the soil and crop. However, the scheme will be extended so as to embrace all phases of experimental work, which will help growers in their pursuit after increased efficiency in sugar-cane cultivation.

It must be pointed out that the Bureau can help only those growers who will try to help themselves. Only by the closest co-operation between growers and the officers of the Bureau can we hope to attain the desired end; and growers have our assurance that we are ready to carry out, in full, our share of the contract.

Mr. A. N. Burns, Assistant Entomologist, stationed at Mackay, has submitted the following report for the month ended 12th May, 1929:—

MACKAY DISTRICT.

Greyback Grub Injury.

Injury to cane by grubs of this pest is now showing up in many portions of the whole district, and many growers who have never before been troubled with grubs, have reported damage this season. Some farmers with many years' experience in the district state that they have never before seen such extensive grub injury.

Inspections made in affected areas during the past month indicate that from the average condition of the grubs, they will continue to be active at least until the beginning of June, before they commence to burrow down to form their pupal cells. When a grub is "fully fed" it assumes a creamy-yellow colour and loses its glossy appearance; but when active and feeding, the skin is clear and transparent, and the soil that has been ingested clearly shows black through the skin at the anal end of the body. All grubs examined so far have not shown indications of being fully fed, therefore injury is likely to be done to cane for a further period of at least three or four weeks. The creamy-yellow appearance of grubs that have finished feeding is due to fat substances being stored up in the cell tissues directly beneath the skin.

Distribution of Injury (Summarised).

In the Sarina area, damage is fairly extensive at West Plane Creek, and a number of farms are affected to a more or less serious degree. During the past, growers in that area have been judiciously cutting out feeding trees and collecting beetles, and, although during the last flighting season no large flight of beetles was noted there, the grub damage at the present time is greater than usual. Several farmers in the vicinity of Plane Creek mill are also affected, one or two farms being seriously attacked.

Around Racecourse the damage appears to be more sporadic, and smaller patches are subjected to injury. The worst damage that has come under the writer's notice, and that is close to the mill, is in the Foulden area, where one or two farms along the Pioneer River are fairly badly attacked.

In the Farleigh area, infestation (with the exception of Habana) is also sporadic, and damage is confined chiefly to the elevated lands and hill slopes. Some fairly large "grub patches" are to be seen on several farms. In the other parts of this mill area, Habana is by far the most seriously affected, and of four farms that suffered grub damage and that were inspected in one day, the estimated losses of the total crop in each case was, in descending order of importance, 40 per cent., 17 per cent., 9 per cent., and 7 per cent. The serious loss of 40 per cent. on the first farm may be considered as a very fair estimate, because practically all the cane was growing on hill slopes where the grub patches stood out plainly, covering almost half of the total area under cane. Close examination revealed the fact that a great deal of the cane had already fallen down, and that much more would soon follow.

In general, most of the damage was confined to hillsides and high banks of watercourses.

In the Owen's Creek district, infestation appears to be general and bad throughout. Practically every farm in the area embraced between the end of Owen's Creek railway branch and a distance of some three miles from Garget, shows grub injury more or less badly. On two farms in particular, it reaches serious proportions, one estimate being calculated at being between 35 per cent. and 40 per cent. of the total crop. Much of the cane was down and therefore too far gone for fumigation, and as the cane could not yet be harvested, there would be little chance of saving the stools for ratoons. Beyond Garget and as far as Hatton, grub damage is showing up in patches on many farms. It is, however, chiefly confined to higher ground, but was also noted in one or two instances on perfectly level ground.

Some very bad injury was observed in the Mia Mia district, where several large canefields were almost wholly attacked, and much good cane had fallen over. The losses in this area were individually greater than any others noted in the district.

Around both Marian and Pleystowe mills, quite a number of farms show indications that grubs are at work. Farther out in the Mount Jukes and The Leap areas, which are usually subjected to the ravages of grubs, have not escaped any the less this season. Several growers in these two localities have been fumigating earlier in the season with carbon bisulphide, and have reported very good results therefrom. It is indeed encouraging to receive such reports, for it shows that results have actually obtained in the field, other than in the nature of "experiments."

Fumigation against Grubs.

As already just mentioned several growers in the two abovenamed districts have been fumigating their cane with carbon bisulphide, and have reported a very good "percentage of killed grubs," and also that the cane treated had recovered from its setback. It is of interest to note from one particular grower's experiences, that he received better results from central stool fumigation than from the usual method of applying the doses of poison to both sides of the stool. The method he employed was to place the injector to the required depth as near as conveniently possible to the centre of the stool, and give one dose directed towards the *opposite* side of the stool, then simply turn the injector round so that the aperature faced the reverse way, and give another dose, facing the operator. Very large stools would receive three doses given equidistantly in the stool.

From this method it was claimed that the grubs being mostly centred directly under, and in the stool, the fumigant was brought more in direct contact with them, and did not have to pass through so much soil, &c., before reaching them. A considerable saving of time was also reported on account of the elimination of going along both sides of the cane rows; by this method both sides being reached whilst going one way along the rows.

Miscellaneous.

The present degree of grub infestation taken over the district as a whole is considerably greater than that which is usually experienced. That this is clearly so may be inferred from the many reports coming to hand from growers who have previously never been troubled with grubs. It does not necessarily follow that the damage next season will be as great, or greater than that occurring at the present time. Many natural factors such as dry weather, &c., may exert considerable check over next season's emergence of beetles. Prolonged dry weather by hardening the ground, frequently causes many beetles to perish within their pupal cells, the hardness of the ground preventing their free emergence. On the other hand if conditions are favourable and all the beetles emerge, natural insect parasites may check many. It is very often observed that after an apparent scarcity of a particular insect, there follows an unusually large number the next season, and that again this abundance is in turn followed by a scarcity. This is generally attributed to the fact that when the insect in question is scarce, its parasites are also scarce, and when plentiful the parasites have an opportunity of breeding up, which, assisted by numerous other factors, helps to restore natural balance.

In view of the present situation regarding grubs in canefields, it would be advisable to growers who purpose fumigating next season, to note the particular areas subjected to attack at the present time, then to be ready to fumigate early next season—i.e., in January and February. It may be well to mention again that both injectors and fumigant (carbon bisulphide) may be obtained through application to the Secretary of the Mackay District Pests Destruction Board; the latter being supplied to farmers at a very much reduced rate of cost.

ABSTRACTS AND REVIEWS.

"FRUIT WORLD ANNUAL."

A Comprehensive Review of the Australian and New Zealand Fruit Industry.

The 1929 "Fruit World Annual," a copy of which is just to hand from the publishers, gives a very comprehensive review of the fruit industry in Australia and New Zealand.

In Australia there are 388,000 acres under fruit, yielding an annual value of over £11,000,000. Details and statistics are given in the "Annual" of the area under the various kinds of fruit in the several States, the quantity harvested and the value. Descriptions are also given of the principal fruitgrowing activities in each of the States and in New Zealand.

The various sections of the fruit industry are separately dealt with—dried fruits, jam and canning, the citrus industry, deciduous fruits, cold storage, &c.

On the subject of marketing, full details are given of the facilities in every State, while as regards export the situation is capably reviewed, particulars being given regarding London, Liverpool, Hull, Manchester, Newcastle, Glasgow, and other ports in England and Scotland, together with details of the principal Continental ports so far developed for receiving Australasian fruit.

The need for sending high quality fruit is emphasised, and to be of practical service, twelve pages are devoted to the subject of packing fruit, with numerous illustrations.

One of the most interesting features from the growers' point of view is the series of illustrations in natural colours of principal fruit pests and diseases, complete with effective remedies for the same. Other practical subjects for growers include the planting of fruit trees, manuring the soil fertility, monthly seasonable orchard work and spraying.

A list is given of the Fruitgrowers' Associations throughout Australia, also a list of the fruit cool stores and the capacities thereof. To help growers to be methodical a bookkeeping system is included, together with details for making income tax returns.

For those interested in statistics of area and production, quantities exported, &c., the "Fruit World Annual" will be found very useful. For the grower the various cultural articles and illustrations are of practical value. Our copy is from the publishers, The Fruit World Proprietary, Limited, Melbourne.

NOMINAL ROLL FOR PLATE 107.

Back Row.—A. J. Crees (Engineer, Mossman); F. Keogh (Experiment Station); J. D. Clarke (Engineer, Pleystowe); R. R. Campbell (Manager, Racecourse); — Chappel (Engineer, Babinda); W. F. Clarke (Mill Overseer, Pleystowe); W. Harrison (Chemist, Plane Creek); J. Pollard (Chemist, Racecourse).

Second Row.—T. Harrison (Chemist, Proserpine); J. W. Inverarity (Managing Director, Pleystowe); H. E. Turner (Chemist, Tully); E. J. Doig (Walker's Limited); H. Horton (Engineering Supply Company of Australia); J. Mackenzie (Chemist, Marian); J. W. McGibbon (Chemist, Cane Prices Board); F. W. Cameron (Cameron's Limited, Mackay).

Third Row.—B. E. J. Martin (Manager, Pioneer); C. Smith (Manager, Cattle Creek); M. B. Davis (Chemist, Kalamia); M. R. Gibson (Manager, Proserpine); M. A. Doolan (Chemist, Mulgrave); Colonel D. E. Evans, D.S.O. (Managing Director, Evans, Deakin, and Company, Limited); Max. Smith (Engineer, Mulgrave); H. G. Goldsmith (General Manager, Walker's Limited); F. W. Heck (Chemist, Rocky Point); R. Clarke (Manager, Pleystowe); R. E. Leek (Chemist, Cattle Creek).

Front Row.—C. J. Thatcher (Chemist, Pleystowe); Val Thorpe (Manager, Plane Creek); C. H. O'Brien (Chemist, Mossman); J. O'Neill (Manager, Marian); W. F. Seymour Howe (General Manager, Mulgrave); Miss Wyllie (Typiste); A. J. Barbat (Barbat and Sons, Mackay); N. Bennett (Technologist, Experiment Station); W. Adams (Managing Director, Bundaberg Foundry); W. Thorpe (Engineer, Plane Creek); H. Martin (Chemist, North Eton); W. Pollock (Engineer, Tully); G. H. Thirkell (Engineer, Racecourse).

Absent.—S. H. Scougall (Manager, North Eton); W. Mackinnon (Manager, Farleigh); J. Evans (Engineer, Farleigh); W. Emerick (Chemist, Kalamia).

PLATE 107.—QUEENSLAND SOCIETY OF SUGAR CANE TECHNOLOGISTS—FOUNDATION MEETING AT MACKAY, MARCH, 1929.
(See page 404).

FUNGICIDES AND DISEASE CONTROL.*

By J. H. SIMMONDS, M.Sc., Plant Pathologist.

Three main lines of attack are available to the agriculturist for the control of plant disease. These are: The use of resistant varieties; the employment of special cultural methods; and the application of fungicides.

RESISTANT VARIETIES.

It has been found that in various crops there may arise from time to time a certain variety or individual which exhibits a marked resistance to a particular disease to which others of the same species are specially subject. This resistance is sometimes the result of an alteration in the anatomical structure of the variety in question which makes it more difficult for infection to take place. For example there may be a thicker outer wall developed by the epidermal cells of the resistant plant. More often, however, resistance is due to physiological factors whose exact nature is usually difficult to ascertain. Some differences in the composition of the cell sap, although so slight as to be undeterminable, may be sufficient to inhibit the growth of the parasite. Resistant varieties can often be improved by breeding and selection, and when suitable commercially their use constitutes the ideal method for overcoming loss from disease. As the resistance is an inherent character of the plant itself, other troublesome control measures can be dispensed with. The growing of wilt-resistant varieties of tomatoes is a case in which a serious fungus disease has to a large extent been overcome by this method. Some varieties avoid disease owing to the fact that they are early or late maturing, and their susceptible period of growth is passed through during that part of the season in which the parasite is inactive. Some useful wheat varieties owe their freedom from rust to this habit.

It should be remembered that, owing to variations in local growing conditions and also probably to the presence of more than one strain of the parasite, a variety may show resistance only in one particular region. Each district has therefore to try out varieties for itself. Also the resistant qualities have to be maintained by careful selection, or otherwise they may be gradually lost. Not only disease resistance, but general vigour and productiveness, can be greatly increased or diminished according to the amount of attention or lack of attention devoted to selection for propagation purposes.

CULTURAL METHODS.

Control measures involving special cultural practice have two main objects in view—(1) To increase the crop's endurance by supplying it with its optimum conditions for growth; (2) to reduce to a minimum the amount of infectious material present by means of general sanitation and crop rotation.

Improvement of Growing Conditions.

It is a fact observed by most growers that it is usually the plant showing poor growth which is damaged most by disease. The strong vigorous individual, although attacked, is not the same commercial

* Reprinted from "Pests and Diseases of Queensland Fruits and Vegetables," by Robert Veitch, B.Sc., F.E.S., and J. H. Simmonds, M.Sc., published by the Department of Agriculture and Stock, Brisbane.

failure, as it is in a better condition to outgrow the effects of the parasite. Moreover, there are some weak parasites which can attack their host only when this is in an unhealthy condition. In attempting to produce a vigorous plant, a rank succulent growth, such as sometimes follows excessive use of nitrogenous manure, should be avoided, since the soft tissues of these plants are often responsible for a more extensive invasion by actively spreading parasites such as the fungus responsible for Irish blight.

The first objective in the control of disease should therefore be an attempt to obtain for the crop its optimum conditions of growth. For this purpose, careful consideration must be given to the drainage and judicious manuring of the land, if this is not altogether suitable for the purpose for which it is required. Good cultivation and if possible irrigation should be practised in order to maintain continuous growth.

The result of inattention to the maintenance of soil fertility can be seen at the present time in the unhealthy condition of many of Queensland's older citrus and other orchards which have been continuously cropped for many years without any attempt at replenishing the soil.

Bad drainage is probably one of the most common sources of trouble, and moreover this condition is not always apparent from a superficial examination of the land, as hardpan or an impervious bar may occur in isolated areas on otherwise well-drained land. Even if not completely killed by asphyxiation, roots subjected to waterlogging may be weakened to such an extent that they become invaded by various fungal and bacterial organisms of the soil which set up a root rot. On the aerial parts various forms of dieback may result from invasion of organisms only able to attack the plant in its weakened condition. Though the primary cause of injury may have been due to excessive accumulation of water, the effect on the plant often does not become evident until some time after this occurred, when the drying out of the soil leaves the plant to feel the effects of a diminished root system.

As several of the fungi attacking the root, crown, and branches of fruit-trees require a wound to enable them to penetrate through the highly resistant bark, care should be taken that injuries are not given during cultivation and pruning. If large branches have to be removed the cut should be made clean and the surface covered with Bordeaux paste.

Sanitation.

In some cases the grower himself is largely responsible for breeding up a disease on his own farm. Much can be done to keep disease in check by merely following out simple precautions for general cleanliness. As refuse from a diseased crop may be bearing the fruiting bodies and spores of the organisms causing disease, all infected material should be carefully burnt as soon as the crop has ceased to be productive. If the disease is observed to be starting in a small area, its spread may sometimes be checked by immediate destruction of the affected plants. Care should be taken that disease is not carried from infected to healthy areas by means of contaminated clothes, boots, pruning tools, &c.

Rotation of crops will allow parasitic organisms to die out of infected fields, and should be practised whenever possible. Rotation is especially necessary in the case of such fungi as species of *Fusarium* and *Rhizoctonia*, which are often able to maintain a saprophytic existence on dead organic matter in the soil and will from this pass to a suitable living

host should one become available. Such fungi can often retain their soil existence for considerable periods, and if possible allowance should be made for at least a three-year interval between plantings of a crop susceptible to a disease with which the field has become infected.

A seed-bed should always be located on land near which the particular crop or a closely related one has not been grown previously, and if virgin soil can be used so much the better. If a suitable site is not available and the crop is one subject to soil-borne diseases, sterilisation of the bed may be resorted to.

Disease may be introduced into a clean area on infected seed or by using cuttings, &c., from diseased plants. Examples of this are seen in the introduction of potato scab by the use of infected sets, and in the spread of Panama disease of bananas by planting suckers from diseased stools. If possible, seed, cuttings, tubers, &c., should be obtained from a district in which disease is not known to be present. If contamination is suspected, various methods of sterilisation may be practised. This is advisable as a routine procedure with those crops subject to seed-borne disease.

DIRECT CONTROL BY THE APPLICATION OF FUNGICIDES.

As was pointed out in Chapter 4, the development by fungi of an ectoparasitic and endoparasitic habit of growth opens up two methods for their destruction. Ectoparasitic fungi, living as they do on the surface of their host, can be killed by direct contact with a suitable fungicide. For this purpose, sulphur applied in the form of a dust or as sulphur compounds in solution has proved most useful. Under warm conditions the sulphur reacts with the oxygen and water vapour of the air to produce a volatile compound to the action of whose fumes the mycelium of the fungus quickly succumbs. The class of diseases known as the powdery mildews are treated by this method. The endoparasitic parasites once within the tissues of their host are safely sheltered from the effect of fungicidal applications. To control such invaders it is necessary to get in early and prevent infection from taking place. For this purpose all the susceptible parts of the plant must be covered with a thin film of poison which, while it is not injurious to the plant itself, will affect the fungus to an extent that will prevent the germ-tube put forth by the developing spore from penetrating the surface. Owing to their protective outer covering, it is not usually possible to kill the spores themselves before germination without using a spray too strong for the plant to stand. Various copper compounds have been found to give the best results in resisting the attack of endophytic fungi. The most commonly used of these fungicides are Bordeaux and Burgundy mixtures. When properly prepared these will not injure the plant, nor are they sufficiently poisonous to be harmful should sprayed fruit be consumed with the chemical still present.

The copper fungicides are usually applied in the form of a wet spray. Of recent years there has been a tendency in some countries to apply the poison in the form of a dry powder as a dust. Reports of the results obtained from dusting as compared with the wet spray are rather conflicting, but dusting on the whole would appear to be a less effective method, especially during a season of heavy rainfall.

The advantages of the dust over the wet spray are—

(1) The ease and rapidity with which a dust may be prepared and applied reduces labour costs.

(2) The apparatus used is less costly and lighter to work with.

(3) No water is needed, which is a consideration in some localities.

The chief disadvantages are—

(1) The results obtained from dusting are often not equal to those obtained from the application of a wet spray.

(2) In order to obtain proper covering it is necessary to dust when the air is comparatively still. If the surface of the plant to be treated is at all shiny, moisture must be present to ensure adherence.

(3) The adherence of a dust is not usually as great as that of a spray, which necessitates more frequent applications.

Reliable copper dusts applied under suitable conditions should give a control sufficient, when the other advantages are taken into consideration, to justify their use. Unfortunately these necessary conditions are not to be had to order, and in the present state of knowledge regarding dusting this procedure cannot be recommended as a universal substitute for the wet spray. It should be noted that the above remarks do not apply to dusting with sulphur, which has been proved to be very effective for the purposes for which it is employed. The difference is that sulphur acts by reason of the fumes which it gives off, and complete covering and long adherence are not of such paramount importance.

To obtain best results from a minimum expenditure of the material, the spraying machines should be capable of delivering the fluid at high pressure through a suitable nozzle so that a fine mist-like spray is produced. This will give a more even and thorough coating than the coarser spray of the low-pressure pump. Spraying on showery or wet days should be avoided as far as possible, as several hours is necessary for a spray to dry thoroughly and retain its lasting properties.

Care should be taken that the crop is well covered with spray during moist or muggy weather, as atmospheric conditions of this nature are very suitable for spore germination and are thus conducive to the spread of most fungus diseases. Hot dry days usually serve as a check to disease, and the delicate spores of many fungi become quickly desiccated during such times.

The number of different specifics which have from time to time been advocated for the control of various diseases is considerable. There are, however, a few which have a more or less general application and which have stood the test of long usage. The more important of these will be shortly described below.

Bordeaux Mixture.

This spray is probably the most widely used fungicide at the present day. It consists of a somewhat indefinite mixture of copper compounds, including basic sulphates, in which the copper has been precipitated until practically none remains in solution. The spray is therefore non-injurious to the plant, since the injurious copper salts cannot be absorbed into the tissue of the living organism unless in the soluble form. Minute quantities are, however, dissolved by the acids of the plant juices, and these are sufficient to prevent fungus infection. The poison in these minute doses also acts as a stimulant to the plant itself, and thereby promoting a more vigorous growth aids it in resisting the invasion of the attacking parasites.

Formula.

Bluestone (copper sulphate)	6 lb.
Burnt or quick lime	4 lb.
Water	40 galls.

This is briefly referred to as a 6-4-40 formula.

Dissolve the bluestone in half the required amount of water in a wooden or copper vessel. If crystals are used, this is best done by tying them in a piece of sacking which is left suspended in the top of the water overnight. Powdered bluestone can now be obtained, which dissolves very readily. Only wooden or copper vessels can be used to contain the bluestone solution, as this chemical will quickly eat through iron. Wooden casks form convenient receptacles.

Slake the lime in another vessel by the gradual addition of small quantities of water, when the heat generated will aid the reaction. After slaking is complete, water is added to make up the remaining half of the total required. Only best freshly burnt lime should be used, as otherwise there is likely to be an excessive amount of useless residue, and the final composition of the spray will be affected. If burnt lime is not available, good-quality hydrated (not air-slaked) lime can be used, but half as much again is required. It is usually difficult to prevent burnt lime from becoming air-slaked in moist climates, but this difficulty may be overcome by slaking the lime before it deteriorates, and keeping under water. For convenience in using later, store a known amount in a known volume of water.

The two solutions, bluestone and lime, are poured simultaneously through a fine strainer into a third container, or the spraying vessel and the mixture stirred well for a few minutes. This method gives a fine gelatinous precipitate which does not readily settle out. If necessary, one solution can be poured directly into the other, provided the latter is kept well stirred during the process. Concentrated solutions should not be mixed before dilution, as the resultant precipitate tends to be of a granular formation and its spreading and adhesive properties are poor. For the same reason the two solutions should be quite cold before mixing. Bordeaux mixture should be used as soon as possible after preparation, as it loses its gelatinous nature after several hours' standing and settles out in the granular form.

It sometimes happens that the lime used is of poor quality and the resultant mixture may then contain an excess of bluestone. This must be avoided, as the soluble copper salt is able to cause injury to the plant sprayed. An excess may be tested for by applying blue litmus paper (obtainable from a chemist) to the layer of clear liquid on the top of the spray. If the colour of the paper turns to red, more lime must be added until there is no change. A rough test is given by allowing a clean knife-blade or bright iron nail to remain in the mixture for a few minutes. If on removal this shows a brown coating of copper, more lime is required.

If a crop is to receive frequent and regular applications throughout the season, as is required for many of the foliage diseases, the above formula can be reduced to one consisting of 4 lb. of bluestone and 4 lb. burnt lime to 40 gallons of water. It is necessary to still further reduce the bluestone content for a summer spray for certain deciduous fruit-trees.

It is sometimes found convenient to make up a stock solution of bluestone and lime: 50 lb. of bluestone is dissolved in 50 gallons of water in a wooden vessel; 50 lb. of quicklime is slaked and water added to make up to 50 gallons. The solutions will keep well if protected from evaporation. One gallon of each will contain 1 lb. of bluestone or lime respectively, on which basis the necessary dilution before mixing for the preparation of any quantity can easily be calculated.

Certain proprietary mixtures, usually in the form of a paste or powder, are now on the market, for which it is claimed that they will form Bordeaux mixture on addition of the required amount of water, thus doing away with the trouble of preparing the home-made article. There are, however, some disadvantages in the use of these mixtures—

(1) They are usually more expensive than the home-made spray.

(2) The exact composition varies with the different makes, and it is therefore sometimes difficult to prepare a mixture of definite strength.

(3) It is found that some of the ready-mixed powders do not give such a fine suspension as the home-made mixtures, so that their spreading and adhesive properties are poorer.

However, if a reliable brand is obtained, these mixtures serve a useful purpose for the treatment of a crop for which it is not desired to acquire the apparatus necessary for home mixing.

Lead arsenate and nicotine sulphate may be added to Bordeaux mixture to give a spray combining both fungicidal and insecticidal properties.

Bordeaux and Oil Emulsion.

This spray has been recommended largely for spraying citrus trees. The addition of the oil has two advantages. In the first place it acts as a spreader giving a better covering. Also it exerts a controlling influence on scale development, and thus counteracts to a certain extent the disadvantages sometimes arising from the killing of entomogenous or insect-destroying fungi by the Bordeaux itself.

Take of a good brand of red oil an amount equal to 1 per cent. of the total volume of spray to be used. Emulsify this thoroughly in one to two times its own volume of water, and then stir well into the mixed Bordeaux. Care must be exercised that the oil is well emulsified before adding to the Bordeaux.

Concentrated kerosene emulsion may be used in place of red oil, the amount used being calculated on the total kerosene present.

Bordeaux and Resin Sticker.

For use in districts subject to heavy tropical rains the adhesive properties of Bordeaux mixture may be increased by the addition of a resin mixture.

Dissolve 1 lb. of washing soda in 1 gallon of boiling water. Then add 2 lb. of resin, which may be crushed into small particles, and boil until the mixture is clear. One gallon of this when cool can be added to every 25 gallons of Bordeaux spray.

Bordeaux Paste.

This is often useful for painting wounds, pruning cuts, &c., to prevent the invasion of rot-producing organisms.

Slake 2 lb. of quicklime in ½ gallon of water. Dissolve 1 lb. of bluestone in another ½ gallon. Mix equal quantities of the two solutions to give the amount of paste required.

Burgundy Mixture.

This spray is more favoured than Bordeaux by some growers, as it is somewhat easier to prepare and can be used when good quicklime is not available. There is little to choose between the fungicidal values of the two mixtures when properly prepared.

Formula.

Bluestone	6 lb.
Washing soda	8 lb.
Water	40 galls.

This can be reduced, when spraying is to be frequent, to a 4-5¼-40 formula. The preparation is essentially the same as in the case of Bordeaux, using the washing soda instead of lime.

The washing soda may contain impurities, and it is therefore necessary to test for excess bluestone as in the case of Bordeaux. As an excess of soda, unlike lime, is known to cause injury in some instances, it is advisable to test the mixture with both red and blue litmus papers. If the blue paper is turned red, an excess of bluestone is present and more soda is required. If the red paper quickly turns a definite blue, too much soda has been used and more bluestone solution should be stirred in slowly until there is no colour change in the litmus.

Ammoniacal Copper Carbonate.

Bordeaux and Burgundy mixtures both have the disadvantage in that they leave a bluish-white covering over the surface sprayed. Ammoniacal copper carbonate, while somewhat inferior to these as a fungicide, can be used on fruit approaching maturity, since it is a clear solution leaving no stain.

Formula.

Copper carbonate	5 oz.
Strong ammonia	3 pints
Water	40 galls.

Make the 5 oz. of carbonate of copper into a paste by the addition of a pint or two of water.

Add the 3 pints of concentrated ammonia to about 2 gallons of water in order to make the solution easier to handle.

Stir the copper carbonate paste into the ammonia water until dissolved or until no more will go into solution.

Add water to make up to 40 gallons.

Lime Sulphur.

Lime sulphur, next to Bordeaux and Burgundy, is probably the most valuable fungicide at present in use. It is even more efficient than sulphur itself in the destruction of ectoparasitic fungi, the mycelium of which is destroyed by the fumes given off by certain of the sulphur

compounds contained in the spray. Used as a protective spray against the invasion of endoparasites, lime sulphur is less efficient than the copper preparations. Weighing against this disadvantage is the fact that lime sulphur has considerable insecticidal value in the destruction of scales and mites. It therefore can be used with advantage when spraying with Bordeaux would cause the destruction of the scale insect destroying fungi, leading to an increase of the insect pests. Lime sulphur can often be used as a summer spray for certain deciduous trees which would be injured by Bordeaux.

Lime sulphur can be bought in the concentrated form ready prepared, or can be made in the orchard. The latter procedure is the more economical for large holdings.

Formula for home-made lime sulphur:—

Flowers of sulphur	100 lb.
Good burnt lime	50 lb.
Water	50 galls.

About half the water is placed in an iron vessel and brought to the boil. The lime is stirred in while this is heating. The sulphur is then mixed into a paste and added, and the vessel stirred until the lime is slaked and the contents well mixed. The rest of the water is poured in and the mixture boiled for three-quarters of an hour to an hour but not longer. The orange-red liquid is strained from any sediment and stored in an airtight container.

The composition of the home-made lime sulphur and also some of the commercial brands varies considerably. Any grower using the spray in quantity should therefore test the strength of the concentrated solution before diluting for spraying. This is done by using a Baumé hydrometer, from which the density of the solution is read off in degrees Baumé. The strengths to be used for various applications are usually specified for lime sulphur of a 33 deg. Baumé as standard. The accompanying chart, adapted from that supplied by J. A. Campbell in the New Zealand "Journal of Agriculture," will enable sprays of correct dilution to be prepared from lime sulphur concentrate of various densities. First determine by means of a Baumé hydrometer the density of the lime sulphur to be used. Find the corresponding degree of density in the left-hand column. The figure in the same horizontal line in the column headed by the dilution required will give the amount of water to add to one part of the stock concentrated solution in order to give this dilution.

Density of Stock Solution in Degrees Baumé.	Dilutions Required, based on a 33° Baumé Standard.							
	1 to 10.	1 to 15.	1 to 20.	1 to 30.	1 to 40.	1 to 80.	1 to 100.	1 to 120.
25°	7·6	11·4	15·2	22·7	30·3	60·6	75·8	90·9
26°	7·9	11·8	15·8	23·6	31·5	63·0	78·8	94·5
27°	8·2	12·3	16·4	24·5	32·7	65·5	81 8	98·2
28°	8·5	12·7	17·0	25·5	33·9	67·9	84·8	101·8
29°	8·8	13·2	17·6	26·4	35·2	70·3	87·9	105·5
30°	9·1	13·6	18·2	27·3	36·4	72·7	90·9	109·1
31°	9·4	14·1	18·8	28·2	37·6	75·2	93·9	112·7
32°	9·7	14·5	19·4	29·1	38·8	77·6	97 0	116·4
33°	10·0	15·0	20·0	30 0	40·0	80 0	100·0	120·0
34°	10·3	15·4	20·6	30·9	41·2	82·4	103·0	123·6
35°	10·6	15·9	21·2	31·8	42·4	84·8	106 1	127·3

Lime sulphur as a winter spray for deciduous trees, or as a winter dressing for the trunk and branches of citrus, can be used at a dilution of 1 to 10 or 1 to 15. At 1 to 40 it can be used as a general summer spray for citrus. As a summer spray for deciduous fruits, dilution of from 1 to 80 to 1 to 120 becomes necessary.

It may be advisable to increase the spreading qualities of lime sulphur by the addition of a casein spreader.

Sulphur.

Sulphur applied as a dust is used extensively for the control of the powdery mildews caused by species of the Erysiphaceæ.

Sulphur dust may usually be obtained in two forms—

(1) Ground sulphur consisting of lump sulphur ground to a powder of varying degrees of fineness.

(2) Sublimed or flowers of sulphur formed by the condensation of sulphur vapour obtained by burning ordinary sulphur.

Sublimed vapour is often finer than many of the commercial brands of ground sulphur, but it possesses the disadvantage of containing small quantities of free sulphuric acid which may cause some foliage-burning and also make the application disagreeable to the operator. Ground sulphur is quite equal to flowers of sulphur when in the same state of division. It loses its bright yellow colour with increased fineness, and good ground sulphur should always be a lighter yellow than the sublimed form.

Fineness of the particles is of the greatest importance, as it confers on the sample greater covering power with more even distribution and better adherence. Fine division is also conducive to greater evolution of the fumes to which sulphur owes its fungicidal properties.

Lime to the extent of 25 to 50 per cent. is sometimes added to the sulphur. This enables a more thorough application to be made than would otherwise be economically possible. It also reduces the chance of burning should the sulphur contain an excessive quantity of free acid.

A still warm day should be chosen for sulphuring, and if the dust is applied while the dew is still on the leaves better adherence will be obtained.

Disinfectants.

The use of disinfectants may be necessary for the sterilisation of seeds of plants subject to seed-borne disease, or the vegetative parts such as tubers, suckers, &c., used for propagation purposes. Seed-beds are also treated with advantage if the ground is suspected of harbouring disease.

Seed disinfection is especially desirable when planting crops liable to seed-borne disease on new land or land that has received rotation. The danger of introducing disease to a clean area by means of contaminated seeds is thereby lessened.

The chemicals commonly employed for the purpose are corrosive sublimate (mercuric chloride) and formalin (40 per cent. solution of formaldehyde).

Owing to the great variation exhibited by these disinfectants in their action on different seeds and fungus spores, no general method can be given for their use. Corrosive sublimate is commonly used at a

strength of 1 part in 1,000, i.e., 1 oz. to 6¼ gallons of water. Small quantities of solution are more easily prepared by the use of tablets obtainable from a chemist. The solution will corrode metal containers, which have therefore to be avoided. The time of immersion varies with the variety of seed employed from about five minutes to half an hour. When treating tubers, cuttings, &c., longer periods can be used. Great care must always be taken when working with corrosive sublimate, as this chemical is a deadly poison.

Formalin is used at a strength varying from ¼ per cent. to 2 per cent., depending on the time of immersion and the material to be treated. To make a 1 per cent solution, add 1 oz. of formalin to 5 pints of water. Other strengths may be calculated from this. The time of immersion varies as in the case of corrosive sublimate.

For these treatments seed is conveniently handled by tying in cheesecloth or a similar open material.

A certain amount of seed injury or retardation of germination sometimes follows disinfection. This undesirable result can largely be eliminated by soaking the seeds in water before immersion in the disinfectant, and washing for five to ten minutes in several changes of clean water after treatment. The pre-soaking provides for less absorption of the poisonous fluid into the interior of the seed, while the subsequent washing removes any injurious compound which might continue its action after removal from the main supply. The seed after washing should be spread out to dry, and then sown as soon as possible.

In Europe and America certain organic mercury compounds are now available for seed disinfection which are proving in many cases superior to the chemicals used in the older methods.

Soil Sterilisation.

By far the best method for carrying out soil sterilisation is by means of steam. This is, however, impracticable for the average grower. Small areas of ground such as seed-beds may be sterilised by means of formalin. The beds are prepared ready for planting and then watered with formalin solution of 1 to 2 per cent. strength at the rate of 4 gallons to the square yard. The beds as soon as treated are covered with sacking, &c., for a few days to keep in the fumes, and then after airing for about a week are ready for use.

When diseases such as damping-off make their appearance after planting, the spread may often be checked by the application of a mixture known as Cheshunt compound. It is prepared as follows:—

Two ounces of powdered bluestone (copper sulphate) is mixed thoroughly with 11 oz. of crushed and powdered rock ammonia (carbonate of ammonia). This stock mixture should be kept in a stoppered bottle. It is dissolved in water at the rate of 1 oz. to 2 gallons, and the solution then watered on the soil so as to thoroughly wet it. The solution can be held in wooden or copper vessels only.

JOURNAL APPRECIATED.

A Kingaroy farmer writes (13/4/29):—*I wish to express my appreciation of the Queensland Agricultural Journal, which I look forward to every month.*

QUEENSLAND RAIN FOREST TREES.

By W. D. FRANCIS, Assistant Government Botanist.

The Water Gum (*Tristania laurina*) is most commonly found in forests along watercourses. The picture of the stem of the tree shows the patteru of the bark. The wood is very finely grained, and is pale or brownish in colour. It is fairly heavy. In the "Queensland Flora" it is stated that the wood is useful for tool handles. The species is found as far north as Gympie in Queensland, and extends into Gippsland in Victoria.

Photo.: W. D. Francis.]

PLATE 108.—WATER GUM (*Tristania laurina*).

A tree in the Rain Forest of Robert's Plateau, Macpherson Range. The tree on the extreme left is the Scrub Box (*Tristania conferta*).

Photo.: Dept. Agriculture and Stock.]

PLATE 109.—WATER GUM (*Tristania laurina*).
A. Flowering shoot; B. Capsule-bearing shoot.

QUEENSLAND SHOW DATES, 1929.

The following is the official list of Queensland Show Dates for 1929, as issued by the Queensland Chamber of Agricultural Societies:—

Bundaberg: 13th to 15th June.
Bororen: 17th and 18th June.
Gatton: 19th and 20th June.
Gladstone: 19th and 20th June.
Mount Larcom: 21st and 22nd June.
Buderim Mountain: 22nd June.
Rockhampton: 26th to 29th June.
Esk: 28th and 29th June.
Wynnum: 30th and 31st June.
Mackay: 2nd to 4th July.
Kilcoy: 4th and 5th July.
Townsville: 9th to 11th July.
Woodford: 11th and 12th July.
Home Hill: 12th and 13th July.
Samford: 12th and 13th July.
Woombye: 12th and 13th July.
Charters Towers: 17th and 18th July.
Caboolture: 18th and 19th July.
Ingham: 19th and 20th July.
Rosewood: 19th and 20th July.
Barcaldine: 23rd and 24th July.
Laidley: 24th and 25th July.
Nambour: 24th and 25th July.
Ayr: 26th and 27th July.
Bowen: 31st July and 1st August.
Maleny: 31st July and 1st August.
Nundah: 3rd August.
Royal National: 12th to 17th August.
Crow's Nest: 21st and 22nd August.
Goombungee: 30th August.
Malanda: 18th to 19th September.
Pomona: 18th and 19th September.
Kenilworth: 28th September.
Rocklea: 28th September.
Pine Rivers: 15th and 16th November.

RURAL LIFE IN OTHER LANDS.

BY THE EDITOR.*

Some years ago, when looking around post-war Europe, visiting different countries, seeing something and learning something of the ways of life, of the customs and accomplishments and general racial characteristics of other peoples—it was a very liberal education, by the way, especially for an Australian—one was everywhere impressed with the density of rural populations and the intensity of cultivation on soils that seemed to a Queenslander hungry enough to turn a bandicoot into a bolshevik. One thought naturally what a country Australia would be, what a State Queensland would be, if it only had a country population of a tenth part of the numbers that inhabit the rural regions of Western Europe.

Racial Resemblances.

Another thing that struck one was the physical similarity of the Continental races, and despite the dicta and dogma of pro-Nordic enthusiasts, there was, or it seemed to me on appearances anyhow, very little difference among the several races besides language, customs, mentality, and creeds.

In the far north of Scotland, in Caithness and Sutherlandshire, one was privileged to meet people of the pure Scandinavian type, whose family names were, obviously, of Norwegian, Swedish, or Danish origin. In Sweden, Norway, and Denmark, and parts of Germany one would meet with types almost exactly similar to those one met in Scotland. In Ireland and Wales one could observe many points of similarity, from the racial viewpoint, with Bretons and other French people of the Biscayan and Mediterranean provinces.

The same points of resemblance were noted as regards British people, Dutch, Belgians and, to a lesser extent perhaps, Italians, of the northern provinces of Italy particularly. In all these countries the Nordic strain seemed to be strong, that is if one could judge by the number of blonde Italians, Frenchmen, and others one met with; while on the other hand the swarthiness of many Englishmen, Scotsmen, Irishmen, and Welshmen, and the Continental races was often very strongly in evidence. Perhaps no better opportunity was ever given the student of humanity—of the white races particularly—than that afforded him in France during the war. There could be met the representatives of every European race, and every type of each race drawn from a variety of home and overseas environment; and beyond manners, dress, and speech, there did not seem very much to distinguish them. One of the finest physical specimens of manhood in the mass I ever saw, by the way, was a reserve division of the French Army drawn from the Alpine Provinces—all picked men, of course, none younger than twenty-five and none older than thirty-five.

When you come to think of it, however, the resemblance of one European race to another is not very remarkable. The Romans (the Italians of the time) occupied Britain for three centuries. Northern peoples, at times, swept down through France and Italy. Vikings invaded Scotland, and the Danes and Normans, descendants of the old predatory Norsemen, invaded England and Ireland. Then, of course, there were the people, the Huguenots and Flemings, for instance, who sought sanctuary in the British Isles; and also those of the British Isles, who, in times of political stress, sought a similar sanctuary on the Continent. In addition, there were the peaceable comings and goings of the several peoples, which despite distance and indifferent transport must have been always going on. The distance from England to France was after all no further than from, say, Wynnum to Cape Moreton, and at one point, Dover to Calais, not much further, if as far, than from Brisbane to Bribie.

This, however, is not a talk on racial problems or racial distribution. In these few opening remarks it is my purpose to suggest merely that, after all, there is much in common between the several European countries. The struggle for existence is the same everywhere and is just as keen in one country as another. Their rural life is more or less common in its simplicity; its very practical endeavours; its sound husbandry, varied, of course, in its evolution from local environment; and, socially speaking, its more or less neutral tints.

A Glance at Rural France.

It is always interesting to look over the other fellow's work when interests are common, to go through his paddocks to see what he has done and how he has fared; and with that idea it is proposed to take a rapid glance at rural France, the

* From a series of radio lectures through 4 QG.

Continental country one knows best of all, and, perhaps from a temporary very close association with its thrifty and kindly peasant people, one appreciates best of all, as the first scene in our survey of rural life in other lands.

France is essentially an agricultural country. In 1911, 55.8 per cent. of the inhabitants lived in rural districts and in towns and villages of less than 2,000 inhabitants. There, as elsewhere in the world, is a steady drift from the countryside to the city. This drift has been going on for the last 130 years, intense industrialism being the main cause. Agriculture, however, is still the predominant industry in France, over 40 per cent. being engaged directly in farming. This cityward trend of rural population has become a very serious thing in a country of a very slowly increasing or static population. In any country where the general rate of increase is rapid, such a condition could not create alarm, for marching with the city expansion country districts would in the ordinary course receive a healthy addition in absolute numbers.

Agriculture in France suffered the greatest relative reduction in actual numbers, and probably the greatest reduction in physical well-being of any industry, during the war operations, and since the war the young men have been abandoning the rural districts, so that farm work to-day is being left more and more to women, old men, children, and disabled ex-soldiers.

In 1920-21, the situation became very acute, and foreign labour, Italians largely, had to be brought in to cope with the shortage of labour in the agricultural areas. During the war France lost 1,636,000 of those engaged in war operations. In addition, deaths among civilians exceeded births by 944,000—nearly a million more to add to the awful deficit—and that number does not include, for the period, the figures for Alsace-Lorraine. In 1919, there were 233,000 excess civilian deaths in France, including Alsace-Lorraine. Thus, France entered upon reconstruction at the beginning of 1920 with a loss of population approximating at least 2,813,000—nearly 3,000,000 deaths, most of which made up the frightful price of freedom paid in human life. Probably two-thirds of this number represented effective man power, and farm labour was depleted through these losses of man power. The depletion of farm labour is not indicated alone by the actual numerical decrease in farm population, for, according to recent reviews, the effectiveness of men still living in rural communities is lessened because of disease and mutilations incidental to the war.

Various estimates have been made of the devastation in the war zone, though, of course, the limits of the area affected by war operations varied from time to time. The maximum area invaded is estimated at 10,514,325 acres, about a thirteenth part of the country, of which 8,242,989 acres were occupied for a long time. The area of devastated agricultural country in the war zone exceeded 4,750,000 acres; and losses of livestock in the ten occupied Departments exceeded 50 per cent. of the 1909-1913 average.

Outside the war zone lack of man power forced millions of acres out of cultivation, and Government requisitions reduced French herds by millions of animals.

How Changing Economic Conditions were Met.

Coming back to generalisations, consciously or unconsciously the French farmer has exhibited marked acumen in his adjustments to the changing economic conditions throughout the world during more than three-quarters of a century.

The world market was flooded with cheap cotton from America and the French farmer abandoned his fields of flax and hemp and restricted his production of fibres, as cheap factory-made cotton goods replaced homespun woollens and linens. The world market was flooded with wheat and the French farmer intensified live stock production. The world market was flooded with wool and the French farmer emphasised meat production. The world market is now, or was until recently, being flooded with frozen beef, mutton, and pork and the French farmer is manifesting a tendency to concentrate on dairy production.

Agricultural Development Determined by Economic Expediency.

In France, more than in any other country in Europe, trends in agricultural development have been determined by economic expediency. Wheat acreage was abandoned not so much because wheat production in France was less profitable, but because there was greater profit in animal husbandry, and for thirty years before the war wheat areas and the production of animal products fluctuated with the variations in the ratio of the price of bread to the price of meat in Paris.

The intensification of animal husbandry took the form of improvement in weight and quality of marketed animals, and although the records of milk production are fragmentary export data indicate a similar expansion of the dairy industry. More and better feeding stuffs were in demand.

During the twenty-one years preceding the war, the production of field crops largely for home consumption and for feeding to live stock became an established farm policy. Cereals came to occupy a minor place among the marketable surpluses of the farm, which for the most part took the form of milk, butter, cheese, eggs, poultry, and wool, with an occasional animal taken to town on market days. Just before the war the sales of animals and animal products accounted for 70 per cent. of the cash income of the typical middle-sized French farm.

Not only had the acreages under wheat and other cereals become restricted, but there was a marked decrease in the acreage of industrial plants and all other field crops except fodder and forage. An outstanding phenomenon of this period was the marked expansion of grazing areas. France was surely going to grass; but was doing so through an intensification of agriculture on the best lands and the abandonment to permanent pasture of the hungrier country which had not proved sufficiently profitable to continue to cultivate.

These changes from extensive field-crop production to intensive animal husbandry was a response to the effect of the economic factors involved in profit and loss, but they were also intensified and hastened by a city-ward movement of country population.

In a country like France, in which for a decade or more before the war the population had been practically static and immigration limited, the rapid growth of cities could take place only at the expense of rural communities and to the detriment of agriculture.

In the next lecturette of this series other trends of agriculture in France, which may be useful in a consideration of some of our own rural problems in Queensland, will be briefly discussed.

Photo.: Dept. of Public Instruction.]

PLATE 110.—A COUNTRY SCHOOL IN QUEENSLAND.

The children attending our country schools are often keen gardeners, and this picture shows the beautiful results of well-guided enthusiasm.

REMOVAL OF COTTON STALKS.

W. G. WELLS, Director of Cotton Culture.

The removal of the cotton stalks at the end of the harvesting operations has constituted something of a problem to the average cotton-grower in Queensland. In the course of the early stages of the present revival of cotton-growing several plans were tried varying from cutting the plants by hand with either cane knives, large sharpened eye hoes, or grubbing hoes, to mowing them down with the ordinary mowing machine. All methods were more or less unsatisfactory, and most growers finally resorted to either ploughing the old crop under when they performed the regular ploughing operations, or ploughing out the plants with a shallow setting of a one-disc plough and then forking the uprooted plants into piles and burning them.

Both of these latter methods are not desirable for several reasons. Generally speaking, little or no rain occurs during the late winter and early spring months, and under such dry conditions it is exceedingly difficult to prepare a compact seed-bed where any cotton plants are turned under in the ploughing operations. Where the seed-bed is of an open nature, it is often impossible to obtain a satisfactory permanent strike if only light planting rains occur. The grower in such a case is then faced with the problem of deciding if it is better to prepare for a replant or to carry on with what stand he has and not gamble on the occurrence of further rain in time for another planting. Generally, he decides in favour of leaving it, and many crops are seen each season with very poor stands, which will prevent the grower from obtaining the maximum possibilities of his soil no matter how well he farms it. In fact, one of the outstanding causes of the large number of low yields which occur every season is the failure of many growers to obtain anything approaching a good commercial strike. If each grower would only endeavour to obtain a perfect 2-foot spacing over the full length of, say, twenty adjacent rows in any part of his field selected at random, it is believed the results would be so surprising that much greater attention would be paid to every factor which has a bearing on obtaining and maintaining a perfect stand.

Another point which makes it undesirable that the old cotton plants be either ploughed out and then forked up or ploughed under in the regular soil-breaking operations is the prevalence of certain insect pests of cotton in Queensland. Two of these over-winter in the bolls, and any operation which ploughs them under the soil does not necessarily destroy them. These insects are the peach grub (*Conogethes punctiferalis* Gn.) and the pink boll worm (*Platyedra gossypiella* Saunders). The former occurs in all of the coastal and Southern areas, while the latter is found in the coastal areas north of Maryborough and in the inland valleys of Central Queensland. The caterpillars of both insects can do serious damage, as many cotton-growers in the coastal areas can testify, and all growers should make every effort to obtain as thorough a clean-up as is possible.

Experiments in recent years by growers and on the Callide Cotton Research Station have demonstrated that a machine can be made which will cut off the cotton plants and leave the land in such a state that the plants and most of the bolls can be easily cleaned up and burned. This machine is only a modification of the ordinary maize slide-cutter, and any grower can construct one at small cost.

The accompanying illustrations show a light one-row machine, which was constructed from bush timber, and a two-row machine. The former one was made by Mr. W. Fuller, of the Wowan district, who has used it for the last couple of seasons. The efficiency of the machine is clearly demonstrated by the fact that each season he has many requests for the use of it by his neighbours. Up to 6 or 7 acres of cotton plants can be cut in a day with this machine drawn by one average-sized horse. The experiences of this grower and his neighbours would indicate that such an implement is entirely suitable for a crop of moderate area.

The two-row machine was designed on the Callide Cotton Research Station, and represents a solidly constructed implement which can be drawn by a team of horses or by a tractor. At the Research Station, up to 13 acres can be cut in an eight-hour day with a tractor, even in plants of around 5 to 6 feet in height.

The same features are included in both of these machines, only, two rolling coulters and two 6-feet knife blades are required in the large machine, where only

one of each is necessary in the smaller one. It was found that some steadying effect was necessary to assist in keeping either machine going in a smooth, straight line, and this was best accomplished by means of the rolling coulter used on a plough. In the one-row machine it is attached on the back of the main beam which is drawn down the centre between two rows; the angling arm, with the knife attached, runs against the row of plants to be cut, thus pressing the knife against the base of each plant at the ground level. The coulter is set on top of the beam over a long slot in it, so that some 4 inches runs in the ground and thus prevents any sliding off to the side by the machine when the blade presses against the plants. The two illustrations of the two-row machine show how the coulters and blades are attached to it.

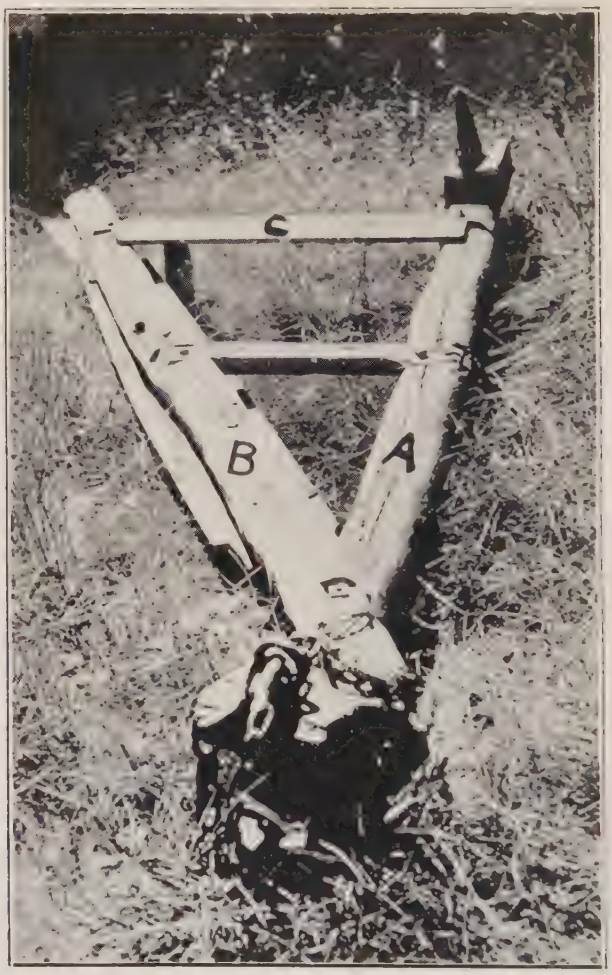


PLATE 111.—ONE-ROW SLIDE CUTTER.

Length of A, 10 feet. Length of B, 9½ feet. Length of C, 4 feet. Knife made of worn-out crosscut saw, and is fastened on lower side of B by means of bolts and a full-length piece of 4-inch by 1-inch hardwood. The latter braces the saw and thus prevents the soil from bulging it between the bolts when the machine is being dragged along the row. Diameter of coulter at end of A is 15 inches. Bearings of hardwood.

PLATE 112.—SLIDE CUTTER.*

An adaptation of the old-fashioned maize cutter, for cutting cotton plants. The box at the rear is a guard over two rolling coulters, which serve to steady the machine so that it cuts more efficiently.

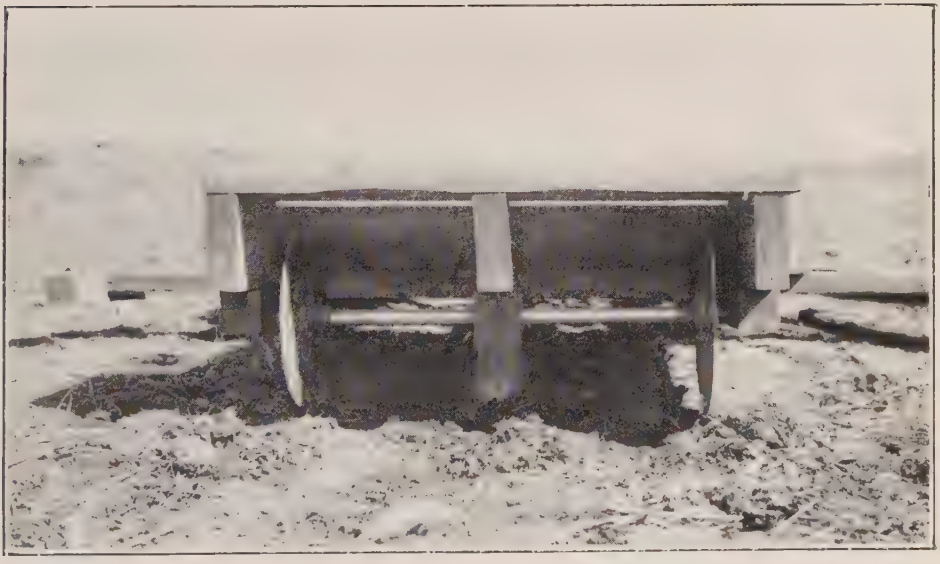


PLATE 113.—REAR VIEW OF SLIDE CUTTER.†

Showing the method of attaching the rolling coulters. These are of decided assistance in steadying the machine, which has a tendency to swing from one row to the other owing to the irregularity of the spacing of the plants.

* After the photograph was taken it was found that a 6-foot blade, instead of three sections of saws, gave better results. Width of saws should clear frame by 3 inches.

† Dimensions of machine are as follow:—Length, 10 feet; width at widest point, 7 feet; width of back carriage, 3 feet; length of arms, 8 feet 6 inches; framework, 4 inches by 3 inches (hardwood).

The plants, after they are cut, can be rolled into piles by means of the ordinary spike-tooth or lever-tooth harrow. The method used on the Research Station is to join three sections of harrows together and drag them crossways of the rows. The plants gradually pack under the harrows until the compact mass partially sweeps up the field. (Some difficulty may be experienced by the bolls sliding under the mass where grassy conditions have been allowed to develop.) Eventually sufficient plants accumulate to force the harrow up and over the roll of them, thus obtaining an automatic self-dumping effect. The plants can be quickly cleaned up in this manner into large wind-rows, and as soon as sufficiently dry will readily burn. It is suggested in this respect that the grower experiment to ascertain when to rake the plants up. They should not be allowed to dry out too thoroughly, because the bolls will open and the seed cotton will drop out and be left on the ground. It can thus be seen that the removing of the plants offers no difficulties, and every grower is advised to equip himself with a machine suitable for his requirements in order that the old crop can be quickly removed.

The early destruction of the old plants is highly desirable. Each season illustrations are met with where the growers delay the destruction of the old plants in the hope of obtaining the top crop of bolls which nearly always remain after the main pickings have been completed. Numerous examinations of such crops have shown that usually only a small percentage of the upper bolls of three-quarter size or larger contain cotton of much value. Generally, the fibres are short and weak and often are badly stained. Usually such crops are held over where no frosts have been experienced, and the grower hopes to obtain a light picking to make up for a low yield. It is difficult to advise just what indicators to use to ascertain if it is worth waiting for such bolls. In the inland valleys it is believed that usually the grower would be wise if he calls a poor crop a "poor one" and wasted no time in preparing for his next season's crop if he intends to plant again on the same land.

The experiences of the majority of the growers in every district and the experiments at the Research Station all indicate the advisability of early planting.

In this connection it may be of interest to present the results of the time of planting experiments which have been conducted at the Callide Cotton Research Station. These are as follows:—

YIELDS IN TIME OF PLANTING EXPERIMENT.

Season 1924-25.

7th October planting	912 lb. per acre
10th November planting	855 lb. per acre
19th December planting	220 lb. per acre
15th January planting—Not picked; failed to mature.	

Season 1925-26.

No October planting.*	
5th November planting	933 lb. per acre
15th December planting	116 lb. per acre

Season 1926-27.

2nd October planting	1,071.5 lb. per acre
22nd December planting—No yield; failed to mature.	

Season 1927-28.

12th September planting	1,734 lb. per acre
5th October planting	1,180 lb. per acre
30th November planting	207 lb. per acre
21st December planting	157 lb. per acre

* No October planting was obtained in the experiment. Plantings in mid-September on another part of the station produced from 922 to 1,473 lb. per acre.

Usually in most districts the first rains in the springtime do not occur until it is warm enough to plant, and if a well-prepared seed-bed has been established a good strike of a permanent nature is generally obtained. It is where the seed-bed is faultily prepared that difficulties are experienced in either obtaining a good strike or maintaining it during the hot, dry periods which are often encountered in October and November. The contributing factor in such cases is generally the delay in starting the ploughing operations. Usually during the first part of June rains occur, and if the preparation of the new seed-bed starts in time to obtain the full benefits of this moisture, a good seed-bed can be obtained. The ploughing is often delayed because of the length of time elapsing in the operations connected with removing the old crop. It is believed, therefore, if each grower equips himself with the most suitable of these cheaply constructed slide cutters, shown in the included illustrations, this delay can often be avoided and a much better chance of securing a good permanent stand will be obtained.

STERILISING DAIRY UTENSILS.

Hot Water.

The practice of scalding utensils with boiling water is still the commonest method of sterilisation. Successful results depend on (1) the temperature of the water and (2) the quantity of water used. Hot water poured around the sides of a can rapidly cools to a point where it is no longer effective in destroying bacteria; the smaller the quantity used, the more rapid the cooling. Experiments have shown that, for an 8-gallon can, *a quart or more of boiling water is required to sterilise it effectively.* It is therefore essential that provision be made for an abundant supply of boiling water; a teakettleful from the kitchen cannot be expected to do the work of sterilising cans, buckets, strainers, separator bowl and discs, &c. A wash boiler or tank set upon a coal, oil, or laundry stove in the milkhouse is a great help in providing hot water for washing, and boiling water for scalding the utensils.

The scalding of buckets, strainers, &c., is very simple, and, if enough boiling water is used and all the inner surface is treated, it destroys and removes large numbers of bacteria. With cans, however, in addition to pouring the boiling water around the sides, it is well to replace the lid, and then roll the can along the floor on its side for three or four complete revolutions to make sure that every inch of the inner surface is treated. Before emptying out the water, the lid may be treated by inverting the can for a few seconds.

Another method of hot-water treatment is useful where the number of utensils to be treated is large. In this method the utensils are immersed for a minute or two in a tank filled with boiling water. The results obtained are superior to those where the utensils are merely rinsed, due to the higher temperature reached, the longer period of contact, and the more complete treatment of the entire surface.

With either method rapid drying-out of the remaining moisture takes place when the utensils are immediately placed on a draining-rack. For the sterilising of dairy utensils, steam has been found to be a suitable, economical, and effective agent.

Chlorine Compounds.

Few farms are adequately equipped for properly sterilising utensils by either the steam or the hot-water method. As an alternative, a method has been devised by which the germ-killing properties of chemicals of the chlorine group have been utilised. In this method the chemical is dissolved in cold water (thus saving fuel and time) and the utensils are treated with this solution. Because of the greater convenience of this method, it is being widely used, both in the milk plant and factory and on the farm, and, where applied intelligently, is giving results which, in many cases, surpass those obtained by the hot-water rinse method.

Intelligent application of chemical sterilisation requires recognition that its efficiency depends upon—

1. The use of a solution of sufficient strength.
2. A sufficiently long period of contact between the solution and the entire inner surface of the utensils.
3. The absence of milk residue, dirt, or other organic matter which destroys the sterilising power of the solution.

There is nothing complicated about the method, but it is not foolproof, and, unless the above simple conditions are fully met, the results may be disappointing.

The germ-killing power of chlorine disinfectants is proportional to the free or available chlorine which they contain. This free chlorine is constantly being liberated and lost, resulting in a more or less rapid decrease in strength, particularly in dilute solutions as prepared for use. Consequently, it is better to make up only enough rinse solution for use at one time, utilising the discarded solution for deodorising floors, drains, &c., in the milkhouse or stable. Either a commercial product may be purchased or a home-made hypochlorite stock solution prepared from which the rinse is made up. The commercial products are usually more reliable as to strength and are very convenient, but are rather more expensive than the home-made solution. With the latter care must be taken to obtain a fresh, non-caked supply of chloride of lime, since this material tends to lose its strength during storage, old stock being often so weak as to be almost worthless for sterilising purposes.

The period of contact with the sterilising solution is obviously important. As with hot water or steam, the longer the exposure to the sterilising agent, the more

complete the action. With chemical sterilisation this must not be less than ten seconds for every portion of the utensil which comes in contact with the milk.

It should not be necessary to dwell upon the third factor—the absence of dirt, milk, &c., from the utensils. Unless these are first of all properly cleaned, no method of sterilising treatment can be expected to give satisfactory results, and least of all the chemical method. *Thorough cleaning is a fundamental necessity.*

Home-made Hypochlorite Solution.

For the benefit of those who wish to make up their own hypochlorite solution, the following directions are included.

Obtain a 12-oz. can of the very best grade of chlorine of lime, fresh, non-caked, and preferably marked with the available chlorine content. Carefully mix the contents of this can into a paste with a little water, gradually adding water enough to make it up to 1 gallon. To this, add 2½ lb. of sal soda. The mixture should be kept in a glass or earthenware vessel, and not in a metal container, because of its corrosive action. Allow it to stand for twenty-four hours to settle, then siphon off the clear liquid from the top. This constitutes the *stock solution*, and is just as effective as the commercial hypochlorite or chloramine compounds. It should be kept in a dark-coloured bottle or jug, tightly stoppered, and in a cool, dark place.

In preparing a solution for rinsing utensils, add four tablespoonfuls of this stock solution to 2 gallons of clean cold water in a bucket. This rinse may then be poured from bucket to bucket, allowing it to remain for ten to fifteen seconds in each. Then it may be poured into a can, the lid replaced, and the can rolled along the floor for half a minute. With properly cleaned utensils, 2 gallons of rinse is sufficient to treat a dozen 8-gallon cans or their equivalent before weakening too much to be effective. Make up a fresh rinse at each milking. Where a commercial product is used, the manufacturers' directions for making up the rinse should be followed.

Where a large number of utensils is to be treated, this may be done more conveniently by immersing each one for ten seconds in a tank or wash vat full of the solution. The solution should be emptied out after use, and a fresh quantity made up for the next time.

Drying Utensils.

With any form of sterilising treatment (except pressure steam for twenty minutes), a few highly resistant organisms survive. At ordinary temperature these will multiply at an astonishing rate in the traces of moisture remaining inside the can, and may thus undo all that was accomplished by the treatment. In fact, experiments have shown that cans which were washed, but not scalded, and placed on an outdoor draining rack contaminated the milk less than cans which were washed, thoroughly scalded, drained, and then stood indoors with the lids on. The unscalded cans at first contained many more bacteria, but the rapid drying of the cans prevented these from multiplying, so that at the end of five hours the descendants of the few bacteria surviving in the scalded, but not dried, cans outnumbered them. Had the cans been held for a longer period, the advantage would have been much more strongly in favour of the dried cans.

The importance of dry cans is fully realised in every up-to-date dairy. In all cases where cans show moisture inside, it is essential that they receive one of the sterilising treatments outlined, and, unless they are to be used at once, they should immediately be allowed to dry by placing them on an open-air draining rack exposing the utensils to the action of both sun and wind. The utensils are inverted and placed on such a rack immediately following the sterilising treatment, the traces of moisture soon disappear, and bacterial growth is checked. On no account should a cloth be used for drying the utensils, for such a practice is bound to add thousands of bacteria to the can surface. The draining rack is simpler, takes less time, and gives far more satisfactory results.

A few people object to the practice of exposing utensils on an outdoor rack on the score that dust may blow into them and thus contaminate the milk. While dust, with the bacteria carried by it has no place in milk, yet it would be less harmful than the enormous numbers of bacteria which develop in a moist can. If, however, there is serious trouble due to dust entering the utensils, this may be overcome by rinsing them with either boiling water or chlorine rinse *immediately before use*. The latter is particularly convenient, as it can be made up in a moment. Care should be taken to drain the utensils well, to avoid any chlorine taint and smell appearing in the milk.

DEVELOPING THE DAIRYING INDUSTRY.

Intensive rotational grazing, conservation of fodder, improvements in type of cattle, and reduction of disease were among the avenues of progress suggested by Professor A. E. Richardson (chairman) when the dairying investigation committee appointed by the Federal Government met in Melbourne recently. The effect of the present systems of land tenure, he said, should be investigated to determine how far they prevented dairy farmers from following progressive policies. The terms of reference to the investigating committee are—

To formulate plans for improving efficiency, increasing productivity, and diminishing costs.

To devise means for enlarging the scope of the £31,000,000 agreement for the purposes outlined by the British Economic Mission.

To determine the prospects of extending the industry in suitable areas in Australia.

Professor Richardson (South Australia) explained that the main task of the committee was to conduct a survey of the dairy industry in Australia, and in the light of evidence available to formulate plans for its improvement. The committee would be relieved of the details by the staff of the Development and Migration Commission. Its methods of working therefore would be to review the evidence collected by the officers.

An Australian Staple Industry.

The dairying industry was one of the three staple industries of the Commonwealth. It involved an annual production of approximately £30,000,000 a year. The present position of the primary producers had been affected by the fall in the price of exported produce and the severe competition owing to expansion of production in other countries. If the industry was to expand, it would do so only by obtaining a higher value for dairy products, which, in itself, would stimulate increased production; and by cheaper costs, which would enable Australia to compete on more favourable terms with producers abroad.

The British market fixed the world's value for butter and cheese and leading items of export. The recent expansion in dairying in other countries, notably Denmark, the Baltic States, Siberia, and the Argentine, had forced Australia to meet with increased competition and lower prices in the London market. There was little hope at present of inducing Britain to change her trade policy, though increasing support was developing for preferential duties on Empire-grown products.

The Overseas Market.

At the moment there was no other market available that was capable of absorbing Australia's production for export, and there was no immediate possibility of obtaining higher values than could be given by the London market.

There was little question that greatly increased production per cow and per farm could be effected if only the many would do what the few were doing—exploit the possibilities of their pastures, adopt rational feeding of cattle, and conservation of surplus fodder, systematically improve the producing power of herds by the use of better bulls, by systematic herd testing, and by better methods of farm management. In no other country in the world were cows so dependable on the quantity and quality of the grass as in Australia.

A calculation that he had made on the basis of the stock slaughtered and stock products exported from Victoria showed that, during the last sixty years from Victoria alone, the equivalent of 2,000,000 tons of superphosphates had been removed from pastoral lands through the grazing of stock and the export of stock products. Probably not more than 10 per cent. of this amount had ever been returned to the lands.

Improved Pastures mean Greater Stock-carrying Capacity.

Judging from results obtained in widely scattered areas in Victoria, there was no reasonable doubt that the stock-carrying capacity of the land could be greatly increased at a cost that would give a handsome return on the expenditure. It was reasonably clear that a very material increase in quantity of pastures and in nutritive value might be expected when fertilisers were more generally used. This would be reflected in increased stock-carrying capacity of milk and butter-fat per cow. More cows might be kept better fed on a smaller area.

He emphasised the value of pasture top dressing and the growth of better types of pastures as fundamental. Another phase was intensive grazing. Young grass was richer in minerals and protein than mature grass. In fact, young dried grass approximated the feeding value of the best concentrates. To obtain the highest production of nutriment from grass, the pastures must be kept short by intensive rotational grazing in relatively small paddocks, instead of allowing stock to wander at large. Whether such intensive methods of grazing were adopted to the best dairying areas in Australia would have to be determined.

Herd Improvement—Fodder Conservation.

He dwelt on the need for the conservation of fodder and improvements in the type of dairy cattle. Two avenues were available—the use of high-grade bulls and the extension of herd testing. Both the Federal and State Governments were financially interested in the improvement of cattle through herd testing. Another important factor was the reduction of disease in dairy herds.

One other matter was that of land tenure. The effect of present systems should be investigated to determine how far they prevented dairy farmers from following progressive policies. In factories there seemed to be two possibilities—to reduce overhead expenses by regrouping and amalgamation, and to improve the quality of the product by improved supervision and the extension of technical knowledge among factory operators.

At present the world's parity for dairy products was too low to enable many of the dairy farmers to finance such reforms without external assistance.

A general discussion followed on preliminary subjects before the committee adjourned.

BUTTER-FAT VARIATION—COWS WITH TIGHT UDDERS.

Why does butter-fat vary in proportion so widely in the same cows? The question has interested many scientific research workers, as well as practical dairy farmers. Among the latest attempts to find some relation between fat content and ordinary working conditions is that of Mr. S. Bartlett, of the National Institute for Research in Dairying, Reading, England, who has made an analysis of the yields of the dairy herd owned by the institute. That herd, comprising Shorthorns and Guernseys, has been individually tested for butter-fat at each milking on three consecutive days in each week since 1922, and has provided 111 complete lactation records for analysis.

The intervals between the milkings throughout the five years have been fifteen and one-quarter hours at night and eight and three-quarter hours in the day, and the conditions, both of feeding and management, were those common to cows in the south of England. Milk secretion is at a slightly lower rate during the longer interval between the milkings; with regard to fat production, in early lactation the weights of fat yielded at the morning and evening milkings were practically the same, but as the lactation progressed the difference between morning and evening yields became more pronounced. From the fourth to the eighth month of lactation, the evening milk contained about 1 per cent. more fat than the morning milk, whereas during the first three months of lactation the morning milk appears to be subject to a still greater depression in butter-fat percentage.

It was found that first calvers in early lactation produce approximately the same, or even a greater weight of fat at the evening milking than they do at the morning milking, and this condition gradually disappears with the advance of lactation. Second calvers produced a little more fat at the morning milking, and in the case of older cows the morning fat yield is proportionately greater; in all-age groups, however, the proportional yield of fat at the morning milking is found to be greater in the later stages of lactation.

Another discovery was that cows with high udder pressure—those with very tight udders—yielded a lower weight of fat at the morning than the evening milking. From this Mr. Bartlett infers that not only does excessive pressure in the udder cause a decrease in secretion, but also induces reabsorption of part of the milk. It is of interest to find apparent reabsorption occurring under ordinary farm conditions.

The small seasonal variations in butter-fat percentage support most of the experimental evidence so far published, showing that foods do not affect the percentage of fat in milk to any appreciable extent, unless those foods upset the health of digestion of the cows. Poor-quality milk during the early spring months may be due to the young grass stimulating milk rather than fat production.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF APRIL IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING APRIL, 1929 AND 1928, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	April.	No. of Years' Records.	April, 1929.	April, 1928.		April.	No. of Years' Records.	April, 1929	April, 1928.
North Coast.	In.		In.	In.	*South Coast*—continued:	In.		In.	In.
Atherton	4·37	27	5·52	1 26	Nambour	5·36	32	19 42	21·78
Cairns	12·09	46	3·78	2·48	Nanango	1·77	46	2·77	6·24
Cardwell	9·39	56	2·37	2·31	Rockhampton ...	2·23	41	8·98	21·68
Cooktown	9·09	52	6·53	1·63	Woodford ...	4·10	41	8·84	19·16
Herberton	4·10	41	0 99	0·63					
Ingham	8·38	36	5·10	2·93					
Innisfail	21·06	47	4·32	5·90	*Darling Downs.*				
Mossman	9·77	15	4·29	2·48					
Townsville	3·62	57	2·50	0·16	Dalby	1·22	58	2·96	5·02
					Emu Vale ...	1·14	32	2·31	4·16
Central Coast.					Jimbour	1·21	40	2·24	4·80
					Miles	1·28	43	4·59	4·59
Ayr	2·65	41	6·23	0·19	Stanthorpe ...	1·61	55	3 80	3·12
Bowen	2·78	57	10 08	1·19	Toowoomba ...	2·37	56	4·96	9·58
Charters Towers ...	1·65	46	2·17	0 20	Warwick	1·57	63	3·53	4·70
Mackay	6·48	57	14·10	6·84					
Proserpine	6·02	25	12·29	5·91					
St. Lawrence ...	2·71	57	9·55	11·93	*Maranoa.*				
					Roma	1·20	54	5·84	3·93
South Coast.									
Biggenden	1·83	29	9·05	5·68					
Bundaberg	2·85	45	7·25	13·54	*State Farms, &c.*				
Brisbane	3·77	78	9 84	14 89					
Caboolture	3·90	41	10·25	17·61	Bungeworgorai ...	0·72	14	6·42	3·91
Childers	2·54	33	7·65	9·76	Gatton College ...	1·53	29	4·37	6·94
Crohamhurst ...	5·78	35	16·66	27·04	Gindie	1·06	29	2·05	6·05
Esk	2·59	41	8·27	16·69	Hermitage ...	1·15	22	3·44	4·00
Gayndah	1·33	57	5·23	2·42	Kairi	4·74	14	0·90	1·20
Gympie	3·14	58	9·92	14·17	Sugar Experiment Station, Mackay	4·93	31	15·45	5·07
Kilkivan	2·01	49	8·41	7·13					
Maryborough ...	3·44	56	12·75	13·34	Warren	1·31	14	...	...

16th May, 1929.

GEORGE G. BOND,
Divisional Meteorologist.

Readers are reminded that a cross in the prescribed square on the first page of this "Journal" is an indication that their Subscription —one shilling—for the current year is now due. The "Journal" is free to farmers and the shilling is merely to cover the cost of postage for twelve months. If your copy is marked with a cross please renew your registration now. Fill in the order form on another page of this issue and mail it immediately, with postage stamps or postal note for one shilling, to the Under Secretary, Department of Agriculture and Stock, Brisbane.

Photo.: Dept. of Public Instruction.]

PLATE 114.—MOTOR BOAT CONVEYING FARMERS' CHILDREN TO THE MAROOCHY RIVER STATE SCHOOL.

Photo.: Dept. of Public Instruction.]

PLATE 115.—NATURE STUDY IS AN IMPORTANT SECTION OF THE YOUNG BUSH QUEENSLANDER'S EDUCATION.

Top: A Lesson in forest botany.

Centre: When shadows deepen—A young nature lover's camp on quiet waters in the heart of our beautiful bushland.

Bottom: Was it a platypus or merely a "yabby"?

Photo.: Dept. of Public Instruction.]
PLATE 116.—SCHOOL'S OUT. SCHOLARS OF STONE SCHOOL, NEAR INGHAM, NORTH QUEENSLAND, READY FOR HOME.

THE CULT OF THE COLT.

By "U9L."*

EQUINE JIU-JITSU.

Holds and Grips.

My idea in this article is to give a bit of a dissertation on what, for want of a better name, may be termed equine jiu-jitsu.

A knowledge of this, even in the most elementary sense, is of value in checking fractiousness, and by its employment often much sweat and straining are saved. In spite of a well-known advertisement to the contrary, there's really no need to use force regularly. By utilising natural means as a curb a better effect is achieved, and the horse, be he either an old stager or a colt, recognises that man is a genius against whom 'tis but waste of time to pit his little brains. I've learned none of this out of a book, nor yet have other men taught me one bit of it. It has been garnered by watching horses at play, in love, and during their expressions of hate and fighting, and though I don't claim that the system is even approaching perfection, and there's much to add to it before a man may write himself a master, it's handy to have if for no other means than to amuse yourself.

I've told you previously of the check utilised by gathering the loose skin under the neck and holding that in your clenched fist. Should a horse—particularly a mare—show a reluctance to back you may employ that to achieve your purpose. With that loose skin in your hand, and pressing slightly in the direction in which you wish her to go, you may make the mare go in a reverse lead in any direction you wish.

Checking a Kicking Horse.

There's nothing checks a kicking horse's ambition like a strap round the ham-string. A saddle strap is just the thing for this, and frail as it is it'll do all wanted of it. With that in position he can't kick. He may swing his leg and make futile efforts to put a bit of ginger into it. But he can't! Failing a saddle strap your own hand may grip that tendon sufficiently to nullify a mighty kick. In fact, if you get the right grip, you may stultify the whole thing by pinching that tendon with your finger and thumb. Dangerous? To a certain extent, sir, but . . .

You'll often see a man trying to check a horse by putting one arm over its neck and the other hand will be employed to pinch the horse's nostrils. He'll maintain that he isn't pinching. But he is—he can't help doing it with the hold he's got. Instead of dropping that other hand on the nostrils, which only makes the horse fight against you to get his breath, if you take him about three inches higher up, and on the bone of the nose, you have the same leverage, the same command, and the horse isn't inconvenienced by having its attention drawn to other matters—the fight against suffocation, for instance.

There's a needle-fine sinew running up the back of the forelegs which, if gripped with finger and thumb, does much to paralyse that foreleg. Failing that elusive tendon, if you take a handful of the muscle in the same place you'll find, nine times out of ten, that horse will drop on that leg; mares, again, are more susceptible to this influence. A similar result is achieved if you bite with your finger and thumb on the front of the bone a few inches above the knee-joint.

The main nerve-centre—or, rather, the plural of that—is just in front of the wither and just behind it. Watch two stallions fighting. Failing that, watch a stallion making advances to a cat-tempered shrew. He knows where to go and what to do to nullify retaliatory measures. If a horse won't stand, and if your hand is strong enough, take a grip of his wither pretty low down and squeeze. It's well to have a bridle on when you do this, and to hold short on the near

*In the "Pastoral Review" for May, 1929, previous notes on this subject by the same interesting and well-informed writer were reprinted in the March, August, October (1928), January, February, March, April, and May (1929) Journals from the February, April, May, July, September, October, December (1928), January, and February (1929) numbers of the "Pastoral Review."

rein with the left hand while you squeeze with the right. If you're not as strong as you think you are the horse will bound forward. But if you have the strength which should be yours you'll see that horse stand stock still and quiver. It will flinch a bit and stand motionless and without the power to move.

A Fool Trick.

This is a fool trick, but it at least shows what sort of a nerve centre is in front of the wither. Mount your horse, take a handful of his mane about 9 in. back from his ears, and pull up with that with all your strength. Press the other hand on the back of his neck just in front of the wither and exert yourself in an effort to squeeze down. Now urge the horse forward. In less than a dozen strides that horse will stumble to his knees, and unless you release your grip lively he will roll right over quite helpless.

How many times have you seen a man holding a horse's foot up and have his hand placed under that horse's fetlock? You'll see it nine times out of ten. That suits the horse right down to the ground. He's got a sling in which to rest his weight, and he has the full use and power of that limb. Take him by the point of the toe of the hoof, and double that fetlock joint. In that position, and particularly with that joint bent, the horse is helpless in that leg and he can't put an ounce of weight on you. He can swing it mildly; but he can't make use of it. The same thing applies both fore and aft. If you double that hind fetlock then the leg is yours. Of course, the horse has three other legs which it may utilise; but the one you've got is yours till you let it go. We've all seen a colt thrown and men essaying to put a loin-rope on it. They'll strain and heave to double those hind legs at the hocks, and mighty are the exertions on both parts—the colt's and the men's. And yet did they but catch the hoof in their hand, double the fetlock joint over and hold it in that position, the hind leg could be folded up and crumpled like a sheet of wet tissue paper!

The flank's another nerve centre. With any sex, though particularly with mares, a grip of the flank makes you the master. Take a short hold of the rein before trying this also. When you've got that grip, and when you're standing in close—as you should be doing all the time—take a handful of flank and grip tight. The horse will flinch, it may even try and bound forward—the short grip of the rein and the fact of being in against it protects you—and it will then stand with one limp hind leg. That's the one of which you have the flank. Take a good hold of that muscle and the horse knows you've got him where you want him.

Another "Button" to Press.

The stifle, which corresponds to a human knee-joint, is another button you press to bring the light of understanding to a mare. Take that in your hand, gripping with your fingers like the teeth of a stallion's mouth, and note her lean over in helplessness towards you. If you've got a short hold of the rein, and if you lift your right foot then and hook the toes of it round her hamstring, and pull with that foot, you'll find the mare will come right over till she overbalances and then she sits down like a begging dog. Her forelegs will be stretched out in front of her, and if you snap with your fingers at the muscles there she'll double that leg to pull it under her. As soon as she does she'll roll over on her side and, if you're smart enough, you whip her tail between her hind legs, up through her flank, and she's yours till you like to let her up again. That takes doing; but it can be done.

The Tail Hold.

Should you not be as smart as you might be, and if the thing struggles up after you've drawn her tail through her flank, there's no need to despair. She's yours again if you're able and willing. Keep hold of that tail, and as she rises to her feet hang on one side of her with your knees pressed against her ribs. She'll stagger along with a dot-and-carry-one action, and when she notes you there, and makes a guess at what you're trying to do, she'll make an effort to bound. She can't. But she'll try. That is your chance. When the thing's partly in the air, and off her balance, using that tail as a lever, and your knees as a fulcrum, throw yourself backwards. The mare will flop heavily on her side and you'll land on your feet beside her. Then, if you've done it right, you can repeat from where you left off last time.

Another nerve centre is a fine sinew running up the back of a mare's buttocks. It's only a little thing, and you may take it easily between your finger and thumb.

If you locate it, and if you pinch it, the mare will do one of several things according to the state of ticklishness which is hers. If she's not very thin-skinned she may ignore it almost, and if she is susceptible to the influence then she'll run back and sit down as though she's been standing on a pat of melting butter.

If a horse won't stand, and you wish to perform any operation while he's standing on his feet, a hold of his tail is a steadier. Get this—it applies equally to mares—and bend it straight back along his spine. Use force in this and press that tail back till its joints are cracking. That horse will spread its four feet wide, it'll extend its head in its helplessness, and it stands like a graven statue of immobility. Do what you will, that horse can't offer any resistance worthy of the name till you've released that strain. It has no after effects, and it's quite safe to use.

Throwing a Foal Without Ropes.

Without ropes you throw a foal by catching him first. To do this you throw your right arm over his neck and curb his bounds by pressing with your buttocks against his chest and propping your own legs straight out in front of you. That's easy and you check his ambitions in no time at all. Moving fairly lively and never giving the foal time to get set and read your intentions, you swing round, keeping your right hand on his neck just in front of the wither, and with your left hand you knock his muzzle over your right biceps—there or thereabouts. Now you press down with a steady strain with your right hand and lever the thing's muzzle up with your biceps at the same time. While you're doing this you make a half-turn to the left, swinging the foal with you, and he goes down on his buttocks and rolls on to his side without any trouble at all. We never used a rope on any foals under about ten months. And we dealt with some sturdy jokers, too! The more a foal struggles and attempts to bound in this exercise the easier he is. It's the fellow who won't move, who stands with widespread legs and ignores your efforts, who stays put and defies all attempts to throw him.

Those are just a few holds and grips, being a very brief outline of what can be done with a little judgment and a fair share of activity. I tell you they can be done, but don't forget the first essential in all things—get in and stay in close. If you do that you have a change of finishing your job in the round yard; if you neglect it you'll finish in the hospital.

Photo.: Jean Easton.]

PLATE 117.

Minto Crag and its Parent Range forms a Protecting Background to Coochin's Rich Agricultural Lands.

POINTS FOR MOTORISTS.

DECARBONISING "DIRTY" ENGINES.

"How often do you have to decarbonise?" is the question that invariably crops up when two or three car owners are comparing notes. The fact that this query is so often raised is in itself sufficient to show that the distance that engines can run between carbonisation varies considerably. This, perhaps, is only to be expected where engines of different design and make are considered, but it usually comes as a distinct surprise to an owner to learn that a car which is identical with his own has to be decarbonised at very different intervals. It is a fact that, whilst some owners of a popular make of car decarbonise every 1,500 miles, others are able to cover a mileage of 6,000 without removing the cylinder head. This discrepancy can in some measure be accounted for by the varying mechanical sensitiveness of different drivers, for it is well known that some owners are quite content so long as the car runs passably and does not give any trouble, whilst the least falling-off in power is a matter of grave concern to others.

The formation of carbon in an engine cannot, admittedly, be prevented altogether, but the rate at which it accumulates is certainly not beyond the control of the driver. Analysis of the deposit found on a cylinder head and piston crown has shown that it has two main constituents; the first is the element carbon, produced by lubricating oil that has burnt and by the combustion of petrol; the other is of a mineral nature and is the result of road grit finding its way through the carburetter.

The Composition of Engine Oil.

Before going into the question of reducing the carbon formed by oil, it will be well to consider briefly the composition of engine oil. There are three main classes—first, those oils that are composed entirely of hydrocarbons (a combination of hydrogen and carbon), and these are by far the most used in ordinary touring engines. Then come pure vegetable oils, which are usually a combination of hydrogen, carbon, and oxygen, whilst in the third class are those oils that are formed by a combination of hydrocarbon (or mineral) and vegetable oils.

No matter what its composition, however, engine oil tends to become thinner or lose body when it becomes hot, and at very high temperatures it will decompose. In the case of vegetable lubricants, the decomposition may first result in the formation of acids, which cause the oil to become rancid, but in the case of a hydrocarbon oil intense heat will result in the oil "cracking"—that is, splitting up into simpler hydrocarbons, such as petrol and kerosene, with the formation of pure carbon. Apart from the loss of its value as a lubricant, an oil that has "cracked" will obviously result in an engine carbonising quickly.

Pure hydrocarbon oils, however, will stand very high temperatures without cracking, although, of course, they will become thinner. "Straight run" oils—that is, those that distil completely over a limited range of temperature—cause less carbon formation than those that are composed of light and heavy fractions mixed to obtain a suitable viscosity. This is because the lighter constituent will volatilise and burn at a lower temperature than the heavier fractions, thus leaving a viscous constituent that cracks under prolonged exposure to heat.

Many good oils contain small proportions of vegetable fats, which improve their lubricating value considerably, provided that these fatty oils are not present in large quantities. They will not affect the rate of carbon formation owing to their high flash-point—the temperature at which they will give off an inflammable vapour and burn—but except for racing, where their property for resisting heat is valuable, oils containing a large proportion of vegetable fats should not be used.

"Cheap" Oils Dear at Any Price.

From these remarks on the combustion of lubricating oils, it is obvious that great care has to be taken in producing them, and this accounts for the comparatively high prices charged for good-quality engine lubricants. It also emphasises the futility of buying cheap oils in the belief that money is thus saved.

It is always wise to follow the engine manufacturers' recommendations, for by doing so the owner is sure not only of getting an oil of good quality but also one that is suitable for his engine. It is quite obvious that a lubricant that is too thin, for instance, will not be satisfactory, because, to give only one reason, there is far more likelihood of it finding its way past the piston rings into the combustion chamber, where, of course, it will be burnt.

Much can be done to reduce carbon formation by keeping the oil in the sump cool, but this, of course, is more a matter for designers than owners. The base of a sump will sometimes be found to be ribbed, and this is done solely to keep the oil as cool as possible. In racing cars, and one or two high-powered production models of Continental origin, makers have gone so far as to fit a special oil radiator. Although it is, of course, beyond the scope of an owner to go to these, he can at least make sure that his front number plate does not interfere with the draught of air past the sump; if it does, the owner will find it worth while to alter the position of the plate.

Much attention has been directed of late to oil rectifiers; these devices are fitted in the oil-circulating system of an engine and serve to remove any particles of solid carbon contained in the oil and to distil off any petrol that may have become mixed with it. Oil rectifiers, however, serve rather to prolong the life of an engine by ensuring better lubrication and to cut down oil bills owing to a less frequent need for draining the sump than to reduce carbon formation.

An Important Point.

The great thing to remember is that oil must be kept, so far as possible, out of the combustion chamber, and in this matter much can be done by a private owner. After an engine has been used for a considerable time its oil consumption almost invariably increases, and this is nearly always due to oil finding its way past the piston rings. The call for more frequent decarbonisation follows as a natural result. When an engine is dismantled, therefore, it is false economy not to replace a piston ring that has become worn or has lost its springiness.

Many manufacturers fit a scraper ring, which removes any excess of oil from the cylinder walls and returns it to the crank case. The actual ring itself does not, as a rule, vary from the others, but the lower edge of its groove is bevelled off, and holes are drilled through the piston; thus, as the latter descends, oil is collected by the ring and forced through the holes in the piston back to the crank case.

Where a scraper ring is not fitted and the cylinder walls have worn, rapid carbon formation and high oil consumption can often be checked by bevelling off the lower edge of the bottom-ring groove and drilling holes through the piston, thus causing the ring to act as a scraper.

When reassembling an engine, always be careful that the piston-ring gaps are not in line, for, besides causing poor compression, this will allow oil to creep past. Descending long hills in gear with the throttle closed is another cause of oil being drawn into the combustion chamber, because the vacuum produced by the descending piston tends to suck oil past the rings. Under these conditions an extra air valve is of unquestionable value, for the throttle can be closed and the valve opened, so that air is drawn into the cylinder and a vacuum avoided.

Aluminium pistons, owing to their high coefficient of expansion, naturally have to be allowed a greater clearance in the cylinder than the cast iron type, and it might be thought that this would result in a more frequent need for decarbonising. Admittedly, there is more likelihood of oil finding its way into the combustion chamber, but this disadvantage is offset by the fact that aluminium is a much better conductor of heat than cast iron. The piston, therefore, runs cooler, and there is less likelihood of oil on the piston crown and underneath the head being burnt.

A certain amount of the carbon formed is produced from petrol, and here again an owner can take steps to reduce it. With a perfect mixture of petrol and air the principal products of combustion are carbon dioxide and water, but if the mixture is too rich not enough air will be supplied to oxidise the fuel completely; as a result, soot—or, in other words, carbon—will be produced. For this reason a carburetter should be tuned to give as weak a mixture as possible without loss of power.

Common Mistakes.

Then, again, excessive use of the air strangler when starting up must be avoided, as this produces a very rich mixture, whilst the carburetter should not be flooded before starting the engine unless absolutely necessary, as this has the same result.

Finally, we come to the question of dust and road grit. This is responsible for a considerable percentage of the carbon deposit in an engine. Some power units are worse offenders than others in this respect, for the air intake to the carburetter is so placed that a large amount of dust is sucked in through the air intake. The position of the intake cannot always be varied readily, but the difficulty can be overcome by fitting an air cleaner to any car on which it is not already a part of the standard equipment. A number of proprietary makes which can be fitted to any engine are now on the market, and their value is unquestionable.

THE FARM TRACTOR.

METHODS OF AIR FILTERING.

By E. T. BROWN.*

The importance of supplying the engine with clean air, through the medium of the carburetter, has been mentioned previously. It is so serious a matter, however, when dust and dirt are allowed to find their way into the engine parts, that further reference may be made to it. The greater part of the tractor's work is carried out under very adverse conditions. The soil is dry and the movement of the outfit and the attached implement raises a cloud of dust. Some means of filtering the air must be found.

There are a number of methods employed for cleaning the air. One of these is to wash it by passing it through a body of water. In passing through the water the air drops its load of dust, and, at the same time, carries with it a certain amount of moisture. This method, therefore, is an excellent one for those engines that need a little water for cooling the mixture when running on kerosene oil.

In another type of filter the air is conducted through curved channels, from which it issues to strike a large central cone. The air is given a whirling motion, which tends to cause it to deposit all dust in suspension that is heavier than air on the sides of the cone. The separated dust falls down the sides of the cone into a receptacle placed below.

A third form is that in which the air is forced through a compartment containing oily wool or some similar material that is capable of collecting the dust. Still another type of cleaner consists of a cylinder of wire gauze on which felt is stretched. The air strikes the felt on entering, and the air alone passes through, as the dust is repelled by the closely woven felt.

Attention to the Air Cleaner.

It is one thing to fit a satisfactory form of air cleaner; it is quite another to attend to it in a proper manner. Under ordinary cultivation conditions the air contains a tremendous amount of dust. If the cleaner be effective, the accumulation of dust during a few hours' work is enormous. Unless the device be cleared out as occasion demands it cannot fulfil its intended function. A clogged filter means that air will be unable to enter the carburetter, and the engine will be so starved that it will either stop altogether or run very feebly and develop little power.

It is important to see that there is no leak in the connection between the cleaner and the carburetter or between the separate parts of the cleaner itself.

Filters, whether of felt or other material, will not be effective if there be any holes in the filtering agent. The dust will easily find an entry through any holes there may be, even if these are only minute. Some cleaners incorporate a number of moving parts. These develop trouble in time, because the parts wear owing to an accumulation of oil and dust. The float in the water-type cleaner may have holes worn in it, in which case a new float must be fitted. Centrifugal types may become so encrusted with oil and dust that their action may cease entirely. Cleaners with small passages may clog up solid, and other kinds may so increase their vacuum effect, due to the accumulation of dust, that the power of the engine is reduced greatly. Whatever system be employed, the maker's instructions should be followed to the letter.

* In the "Farmer and Settler."

If you like this issue of the Journal, kindly bring it under the notice of a neighbour who is not already a subscriber. To the man on the land it is free. All that he is asked to do is to complete the Order Form on another page and send it to the Under Secretary, Department of Agriculture and Stock, together with a shilling postal note, or its value in postage stamps, to cover postage for twelve months.

SELECTING THE BREEDING SOW.

POINTS TO BE OBSERVED.

E. J. SHELTON, H.D.A., Senior Instructor in Pig Raising.

There is no more important job associated with the introduction of pig raising on the farm than that of knowing what to do, where to purchase, what price to pay, and how to select the breeding stock. The points to be observed in the selection of the sow (as is also the case in selecting the boar) are the same, whether one sow or 100 sows are being selected; hence a general outline of the method of procedure and of the various points to be looked for will be of value. Mr. Shelton's notes on these matters are the outcome of a lifetime's experience, and should be of particular interest to all those associated with the pig industry.—ED.

In selecting the breeding sow, the essential points to be looked for are:—

(1) Knowledge of ancestry and pedigree.
(2) Healthy and vigorous constitution.
(3) Maternal instinct.
(4) Body development.
(5) Indications of milk production.
(6) Evenness of type and conformation.
(7) Breeding value.

HEREDITARY FACTOR.

It is necessary first of all to remember that no matter how good the boar may be or how efficient the system of management, unless the breeding sow is capable of producing, suckling, and rearing satisfactory litters, the business of pig raising will be a failure. The writer has heard breeders say of their sows that money could not buy them; thus indicating the paramount value they place on these animals. Therefore, the first thing is to ascertain whether the sow it is proposed to purchase comes from parents of a prolific, easy feeding, quick maturing strain. As with the boar, it is not possible to determine these qualities by appearance alone. The only reliable guide to inherited qualities is the pedigree with stud records, litter records, and fecundity records (if they are available), together with the assurance of the breeder and of his records.

Breed Records.

In Australia, the interests of breeders of stud pigs are cared for by the Australian Stud Pig Breeders' Society, an organisation having a Federal Council with branch committees in each of the States. In Queensland the office of the society is at 3 Inns of Court, Adelaide street, Brisbane, the secretary being Miss Joan Mackay, from whom all particulars regarding the breeding of any particular animal registered or eligible for registration in the Australian Stud Pig Book may be obtained.

Registration of Records.

This society keeps stud records of all registered animals and of the litters of registered sows, and arranges for official transfers when stock pass from the care of one breeder to another. In this way it is possible for purchasers of purebred pigs to ascertain with a maximum of certainty the breeding records of any particular animal they desire to purchase or inquire about.

Hereditary Influence.

Pedigree and breeding records are of the utmost value and should on no account be overlooked. It is wise to remember, too, that though individual excellence of the animal itself is highly desirable, it really occupies second place in comparison with the quality and production records of the parent stock. Pedigree is simply the permanent record of the breeding of an animal, and is of little value in the

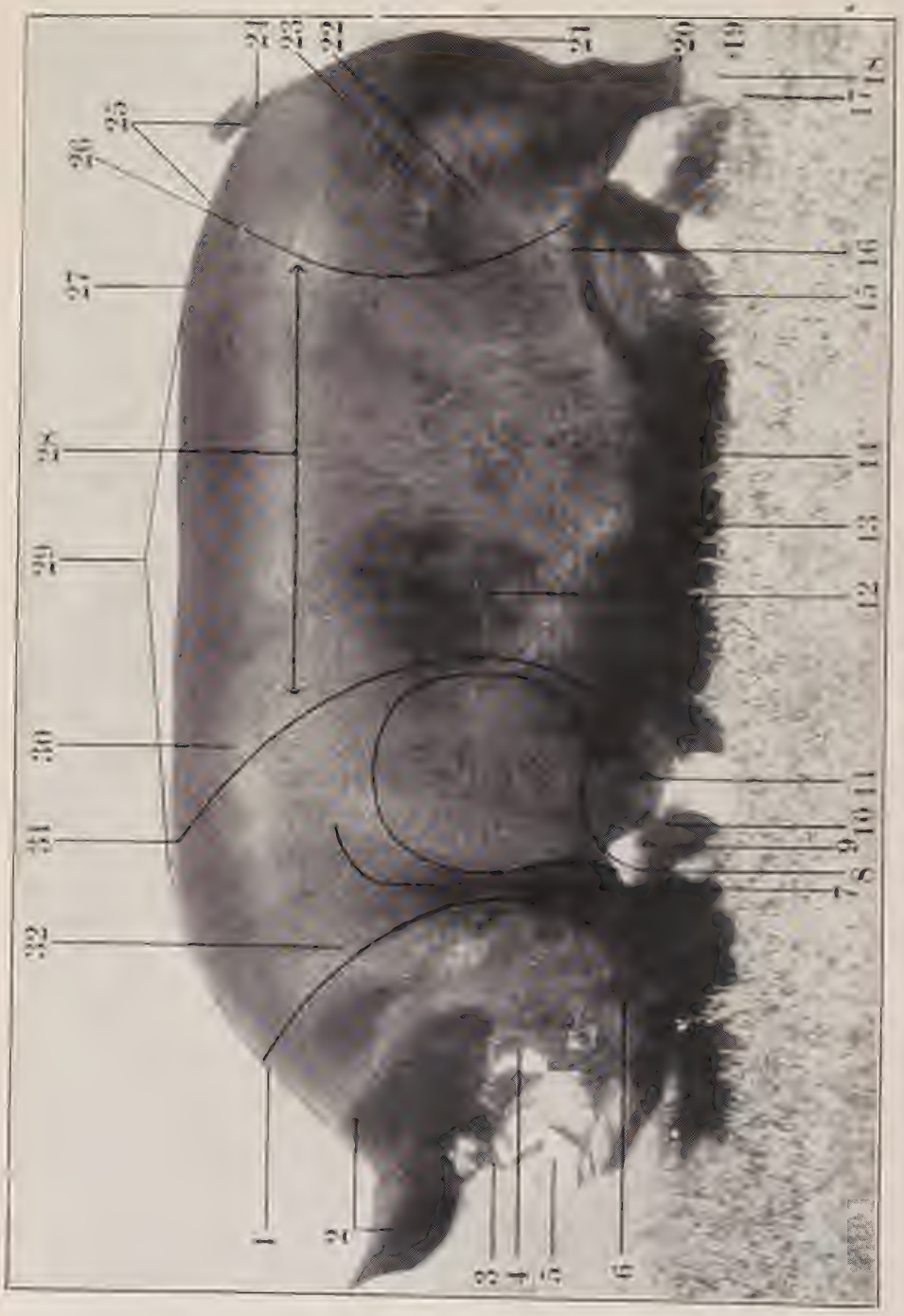


PLATE 118 (Fig. 4).—The Points of a Pig.

DESCRIPTION OF PLATE 118.

Principal Points of the Pig.

1. Head.
2. Ears.
3. Eyes.
4. Face.
5. Nose or Snout.
6. Cheek or Jowl.
7. Shoulder.
8. Shield on Shoulder especially in Males.
9. Chest.
10. Knee.
11. Forearm.
12. Side and Ribs.
13. Belly.
14. Site of Sheath in Males.
15. Teats.
16. Flank.
17. Foot and Hoof.
18. Pastern.
19. Dewclaws.
20. Fetlock with Hock Joint close to the figure 21.
21. Site of Testicles in Males—At top of line above figure 21.
22. Stifle.
23. Ham.
24. Tail.
25. Rump.
26. Hindquarter.
27. Loin.
28. Middle Piece.
29. Back.
30. Top of Shoulder.
31. Forequarter.
32. Neck

absence of records indicating the capacity of the strain to breed true to type, and of the ability of individual representatives to prove profitable by producing stock of equal or superior merit to those produced by the parents.

Other Features.

Even with crossbred or non-pedigree stock it is necessary to study the records indicating such important features as prolificacy, prepotency, early maturity, &c., otherwise one may select as breeding stock the progeny of animals that have produced small and unprofitable litters, even though the individual members of the litters may have been true to type. The capacity to breed freely, regularly, and satisfactorily is certainly hereditary and is transmitted in no uncertain way. A breeding sow selected from a litter of three pigs cannot be relied upon to produce large and satisfactory litters, even though individual animals in such litters may occasionally prove productive.

Constitution.

The innate bodily strength of an animal and the ability to withstand adverse conditions together with the capacity to resist disease is referred to as constitution, and as such represents an extremely important point in brood sow selection. The vigour and health of the animal is dependent upon its constitution, though it is possible to ruin a good constitution by mismanagement and neglect. In the pig a strong vigorous constitution is indicated by a full, broad, deep, capacious chest and roomy heart girth; good width between the eyes, ears, and forelegs; clear bright eyes, and moist snout; soft, silky, mellow skin and hair, and attractive healthy action.

Vigour.

Pigs need to be strong and healthy if they are to prove profitable, and it is important that all the features referred to be sought for in the selection of such animals.

MATERNAL INSTINCT.

To be distinctly effeminate and of a gentle, matronly disposition, withal to be well developed, of good size, and of an attractive type is highly desirable in a breeding sow. Coarse masculine types that run to fat and that lack maternal instinct are quite useless. By maternal instinct is indicated the capacity of the sow to desire to become the mother of numerous progeny and having produced such families to be able to care for and suckle them in true motherly fashion.

BODY DEVELOPMENT.

In the course of one's travels one frequently comes across big, burly, "beefy" sows that look as if they would turn up their noses at the job of suckling litters, these sows being often of a savage, cranky disposition, preferring all the time to fill their stomachs with whatever food there is available, and then to go and sleep off the effects and live a life of ease. This type of sow is a bug-bear to the industry, as also are those small, chubby, pot-bellied types one frequently notices on farms where wild pigs have been kept, and where it is the practice to mate the the sows just as soon as they are big enough and are ready to take service.

Size and Conformation.

Breeding sows should be large, roomy, and well proportioned, with wide capacious chest and long deep bodies and hindquarters, otherwise they are unable to allow for the development of large thrifty litters and for their free and easy birth at farrowing time. The capacity to produce and rear numerous progeny must be encouraged by proper development during the early stages of the animal's life, and by its selection from strains noted for these desirable and necessary qualities. This requires that during the growing stages the animal should be encouraged to grow and stretch out in preference to being fattened, and this can only be done by permitting free range over succulent pastures where the animal will have opportunity of picking up not only green food and mineral element, but will have the benefit of sunshine, exercise, and a clean healthy environment. One pities the sows that are kept continuously penned up in small ill-ventilated and insanitary pens and yards. The stock themselves appreciate the provision of roomy paddocks and succulent pastures, and grow and develop to considerably more advantage than is possible under conditions unfavourable to quick growth and maximum bodily development.

INDICATION OF MILK PRODUCTION.

Another feature that should be carefully sought for is the one indicating the ability of the sow to produce a large and continuous flow of milk. Many breeders overlook this most important point and select their stock without any reference at all to the capacity of the dam to milk heavily. In recent years considerable attention has been given to the milk production records of milch cows, and the farmer is now very out of date who does not make careful inquiry into the milk yield of the families from which his dairy cattle are selected. It is a fact that some strains of pigs and some animals are very poor milkers and do not produce sufficient milk to satisfactorily nourish their litters. Other strains are noted for their ability to milk heavily and to suckle freely. It is possible, if records were kept, it would be found that some breeds are heavier milkers than others, and in this connection it is the writer's observation that the Yorkshires and Large Blacks are

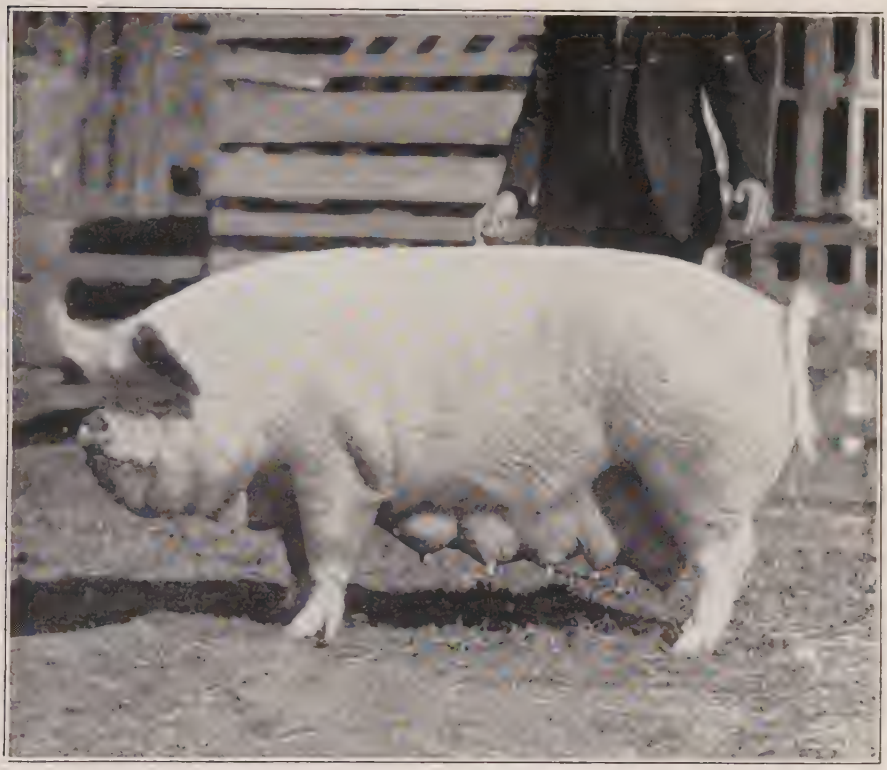


PLATE 119 (Fig. 2).—TYPICAL BREEDING SOW OF THE MIDDLE YORKSHIRE BREED.

A sow capable of rearing large, thrifty, early-maturing pigs. Note the remarkable development of udder and teats, indicating the capacity to produce large quantities of rich milk.

She was about two years old when photographed, and won the Reserve Championship at the Melbourne Show.

heavier yielders than other breeds common in Australia, though it is acknowledged that there are many very superior quality females in breeds other than these two of British origin. It is possible, too, that even in these two breeds there may be found "duffers," poor mothers unable to satisfactorily rear litters, but this is certainly the exception and not the general rule. A sow should have at least twelve and preferably fourteen sound, prominent teats evenly placed equidistant along both sides of the belly. Blind, small, or improperly placed teats set too close together are an objection, even though at times small and apparently improperly developed teats may develop to advantage during the suckling period. At any rate, it is

certainly important that consideration should be given to the selection of breeding stock from strains noted for production, and where animals are found to be unproductive they should be immediately culled and disposed of for slaughter to the butcher or bacon curer.

In just the same manner breeding sows that prove their capacity to produce freely, regularly, and abundantly, and that are noted as heavy and continuous milkers should be retained, and stock selected from their litters should be used, even in preference to fresh and unrelated strains about which, possibly, one has but little knowledge.

Keep the Best.

The policy of taking all you can out of an animal and giving back little in return and discarding such an animal after a year or two is not a good business proposition; it is far better to retain strains that have proved themselves and

PLATE 120 (Fig. 3).—THE EX-CHAMPION OF CHAMPIONS.

A unique photograph of that famous sow, "Brentwood Dorothy," now deceased. She realised at public auction at the Sydney Show Stud Pig Sales, six years ago, 130 guineas. This sow was a profit-maker of the highest order, and was just as good as she looks. The purchasers, McPhee Brothers, of the Richmond River District (to the right of the picture), are shown in company with Mr. H. J. J. Honey, another enthusiast in pig breeding and in stud stock.

endeavour to develop these still further. It is also much more profitable, especially seeing there is sometimes some difficulty in securing what one may term really high-class productive and reliable strains.

OTHER POINTS.

Easy feeding, contented, docile strains may be depended upon to transmit these qualities to their progeny, hence in studying economy of production it is wise to remember the more pounds in weight animals can put on in a given time on a given amount of food the greater the margin of profit and the lower the cost. Successful pig raising depends upon the production of more pounds of pork and bacon from the food consumed.

Points to Look For.

The breeding sow should be fairly low set, of good length, good constitution, deep-bodied, strong in the back, broad and deep in the ham, and be symmetrical throughout. She should stand squarely on her feet and legs; her head should be refined, indicating quality and representing the feminine type. A good breeding sow invariably has a neat feminine head.

The neck should be short, fitting smoothly into the shoulders, which should be broad, deep and smooth on top, well fleshed, but free from any sign of coarseness. The back should be long and straight, with no sign of weakness or falling away (sows that have a weak or hollow back rarely produce good pigs); it is an advantage to have the back slightly arched. The evenness of width of the back is also important, as this influences the width of the loin connecting the back to the hams in a strong arched fashion.

The sides should be long, deep, and smooth, and free from wrinkles; the top line and underline straight and even. The rump should be broad and well topped up; the tail set high and on a level with the back; the tail should be curled, as this is an indication of health and vigour. The rump should not fall away or droop. The hams should be wide, deep, and well fleshed down to the hock; the legs straight and strong, with good, strong bone. One very common fault is weakness of the knees and pasterns. The leg bones should be fine and close in texture, not round or porous; the feet comparatively small and not splayed; the flanks should be thick and carry a good proportion of flesh, as the belly of a side of bacon is considerably increased in value if the flesh is thick and firm.

The Teeth, Tongue, and Eyes.

In general, the breeding sow does not develop tusks to the same extent as the boar, though some sows have quite prominent teeth. Attention should be paid in the selection of breeding stock to note that their teeth are in order, though it is a difficult job at any time examining a pig's teeth. Occasionally one notices breeding sows (in particular) with long overshot top or lower jaws, and with the tongue permanently protruding either from the front or side of the mouth.

The writer considers these faults as very serious ones which are decided by hereditary tendencies, and faults that should on no account be overlooked either on the farm or in the show ring. Undershot crooked jaws, bad teeth, a crooked snout, or a snout with a decided hump are all to be avoided.

Similarly, roached or hollow-backed animals with "cow licks" or tufts of hair turned up or awry on the shoulder back or rump are to be avoided. It is wise also to pay special attention to an inspection of the eyes, for, strange as it may seem, some sows, particularly of the short, fat breeds are quite unable to see. In some cases, individual animals will be noted with no eyes visible at all. On more than one occasion the writer has culled breeding sows on account of blindness, and has been offered stock so affected.

Occasionally this defect develops with age. The matter is sufficiently important to warrant attention. On one occasion the writer was offered (by a very prominent breeder) a really choice sow suitable for show purposes, that on inspection turned out to be a barrow. The vendor (manager of a large piggery) admitted he had always inspected by standing in the passage outside the pen while the pigs were being fed and admiring their broad, even, well-developed backs.

Sows might, of course, be non-breeders without exhibiting any external indication of this very serious defect, though to the experienced eye there is something in the appearance of an animal that acts as a fairly reliable guide, but not an infallible one in cases of this description.

Strength of legs is desirable in the sow as in the boar. It is equally essential to avoid selecting sows showing any indication of umbilical or other forms of hernia (rupture). Some Poland-China sows (in particular) show remarkably heavy development of loose skin in the "twist"—that portion of the hindquarter between and at the back of the legs. In some instances there is an appearance as of a scrotal sac, though this is not usually an indication of hernia or malformation.

Even Temperament.

Never select a nervous, fidgety animal for she will make a poor mother and generally a poor suckler. In order to save more pigs at farrowing time, the sow must have an even temperament. She should be easy to handle and not become irritable when the attendant enters the pen.

PLATE 121 (Fig. 1).—TYPICAL PRIZE-WINNING TAMWORTH SOW "MANNING ELNORA" (243).

This sow appeals as one of the most typical and up-to-date Tamworths exhibited at Australian Shows. She was a prize-winner at Brisbane Royal National Show. Note her compactness, width, and depth of ham and side and the fine quality hair and skin. An ideal type of breeding sow. She reared many successful litters and is of a type much sought after. She was valued at more than thirty guineas at an early age and produced several hundreds of pounds' worth of stud stock.

Savage, vicious sows (sometimes erroneously referred to as "man eaters") are to be strictly avoided. Care should be taken to avoid classing a sow as a "man eater" if she is suddenly disturbed while sleeping with or suckling a new born litter, especially if disturbed by a stranger whose attention she is unaccustomed to. It is but natural for a sow to protect and care for her progeny (the boar usually sees to this too if he is about) especially while they are very young and unable to care for themselves to the extent that is possible as they grow older.

A good breeding sow is as careful with her babies as is a good matronly hen mothering fifteen to sixteen chicks. Many sows are of a coarse "don't want to breed" type that simply flop down on top of their young ones and smother them one by one till all but one or two of the strongest and most cunning ones remain. Other and better sows take the greatest care possible in rising or lying down in order to give their young ones a chance to escape being crushed. These matronly qualities are certainly inherited and transmittable.

Similarly, good breeding sows of the domesticated race of pigs appear to have enough common sense to know that their owners are watchful and careful and are not out to rob them of their suckers.

Value of Breeding Sows.

It would be well for the beginner, especially if he or she does not know the value of breeding stock, to get in touch with some reliable, and, as it were, disinterested person with a view to enlisting their assistance in these all-important matters. It is first of all necessary to value the animals to be selected in association with the environment under which they have been developed. The very fact that a stud sow or boar (none other than selected animals would be offered unless by special arrangement) was being selected from a stud like, say, Gatton, Hawkesbury, Dookie, or Roseworthy Colleges, or from the studs of other breeders equally as well and favourably known, immediately indicates that it has a value a good deal above that of ordinary "meat" market stock. The reputation of the stud in this case is a guarantee of value, though, of course, unfortunately, no breeder can absolutely guarantee that any one or other of the animals offered or sold will turn out to the seller's or to the buyer's expectation. The health and well-being of an animal is dependent to a very considerable extent upon the health and well-being of other animals in the same stud, and in this way also added value is given to animals selected from reliable healthy studs.

Condition.

The breeding, pedigree records, &c., all add value, for it is but right that a specially selected, registered (or eligible for registration) animal should carry a higher value than common unregistered stock. Again stock that have been properly prepared for sale, have been well advertised, and are in the pink of condition at time of inspection, will command higher values than stock not properly prepared or from studs that do not bother about these things. A good wash and clean-up and bright glossy skin and hair are recognised the world over as additions to the toilet that add considerable value, and that in their own particular way are extremely important items, though one does not want to pay an excessive price for soap, water, and oil, unless the quality and guarantee of breeding are there.

Value is added to any article in accordance with the way in which it is placed before the prospective buyer, and this refers to stock in just the same way as it refers to any other line of merchandise. There are, of course, the "go-getters" in the stock world, just as there are in the commercial world, but, at any rate, value is added to the animal that is correctly described and is placed before the prospective buyer to the best advantage possible. The pen, sty, yard, paddock or other enclosure in which an animal is confined whilst awaiting inspection, adds its quota of value or detracts from same. If the prospective buyer has to wade through mud and slush inches deep, and has to run the risk of being splattered with mud whilst inspecting the stock, his idea of their value will be on an entirely different plane to that which would be effective if the animal were offered in a clean, cosy, comfortable pen in an environment that indicated that the comfort of the buyer was pre-eminent in the mind of the seller. The purchase of breeding stock that have been awarded prominent and valuable prizes at agricultural shows, and that come from prize-winning strains, well-known, adds a value which is difficult to estimate in pounds, shillings, and pence.

SPECIAL NOTES RE ILLUSTRATIONS.

Figs. 5, 6, 7, 8, emphasise the importance of studying the condition of the breeding sow, for on this depends much of the success in the handling of both sow and her progeny. Many farmers do not allow their sows to develop sufficiently or grow large enough before mating, nor do they allow the sow sufficient nutritious food during her breeding period. Some sows are kept in a very fat and unprofitable condition. The ideal breeding condition is shown in Fig. 4.

PLATE 122 (Fig. 5).

PLATE 123 (Fig. 6).

Figs. 5 and 6 are of farm sows of uncertain breeding too low in condition to prove satisfactory. The young sow in Fig. 5 is too low in condition to mate to the best advantage, while the sows shown in Fig. 6 are too low in condition to rear their young satisfactorily. Sows in such a condition frequently suffer for many months after farrowing, and even if they do not develop paralysis their progeny are more liable to disease and to abnormal troubles than the progeny of sows in medium breeding condition. Sows of the types illustrated should not be retained as breeders as their breeding is doubtful and there are plenty of better type sows available at comparatively low prices.

Selection.

The first pick of a litter or of a special line is, of course, always placed at a higher value than the second, third, or later selection; this is, of course, but natural and is quite in order in the business world. All things considered, then, it is somewhat difficult to indicate just the amount one might have to pay for any particular line of stock offered.

In general, however, it might be taken as a fairly reliable guide under Australian conditions that a good breeding sow is worth not less than three guineas at from two to three months old. This is a low value in the South, where the demand is more permanent, and where the value of stock is better appreciated. "Six guineas each," the Victorian breeder would be inclined to remark if asked the question referred to, and much the same conditions rule in New South Wales. In the other States values of from three to five guineas each at two or three months rule. Boar pigs are usually considered more valuable than sows. Some studs—like Gatton College—have a range of values allowing one guinea more per head for boars than for sows. It is all a matter of arrangement.

Plate 124 (Fig. 7).

Fig. 7 is of a Poland-China sow too fat to prove satisfactory as a breeder. She is carrying far too much condition and would be liable to suffer from such troubles as heat apoplexy as well as milk fever. This photograph was taken a few days after this sow arrived from America some years ago. Her condition was in part due to the generosity of the passengers and crew on the steamer who were anxious that the pigs should arrive in the very best of condition. The sow proved a failure as a breeder largely as a result of this overfattening, and had to be sold to the butcher.

Grade Sows.

For ordinary breeding sows (not pedigreed) values must be based on the actual "meat" value of the animal. One cannot expect to purchase selected breeding sows at less than their market value. In fact, a seller is justified in asking a higher value for the pick of the stock available. In the case of ordinary breeding sows, therefore, values may be placed at from three guineas to, say, six guineas at from, say, four to eight months old with lower or higher values according to age. Ordinary breeding sows quoted as "in pig" should be worth ten guineas each upwards if they are of good quality and breeding.

Stud Sows.

Stud sows could be valued at not less than three guineas at two to three months old up to, say, twelve guineas or more as yearlings. Sows quoted as "in pig" are worth more than sows that have not been stinted (mated), though there can be no guarantee that a sow will hold to the service of the male, and no responsibility should be accepted by seller or buyer unless by special arrangement.

Especially selected show sows and prominent prize-winners would, of course, carry a higher value than the above. The same also applies in the case of the boar, and values of from fifteen to fifty guineas might be referred to as reasonable where the quality and reputation of the animal justifies the payment of higher values.

In each case it is a matter of arrangement as to whether the price covers cost of delivery in crate on rail, steamer, or other conveyance, and as to whether crate is to be returned or be paid for. Crates in themselves are worth from twenty to thirty shillings or more each if well made and suited to the job. Rail freights and other expenses must be arranged for, and unless otherwise specified, it can be taken for granted that the buyer takes all risks once the animal is safely delivered at point of despatch.

PLATE 125 (Fig. 8).

Fig. 8 is a prize-winning Gloucester Old Spot sow. At the time this photograph was taken this sow was rearing a large litter of active, vigorous pigs approaching weaning age. She is in ideal condition for a sow at this stage, for it is not to be expected that a sow will hold her condition whilst suckling. This emphasises the necessity of having the sow in proper condition prior to farrowing time in order that she may be able to do justice to her family.

A word in conclusion in regard to the condition of animals at the time of despatch. Nothing is more disgusting to the buyer than when the stock he has purchased arrive at their destination in a dirty, filthy condition, infested with hog lice or other parasites. The seller's reputation is at stake in all these matters; hence every effort should be put forward to ensure safe and satisfactory delivery.

It should be needless to add that in a country like Australia, where distances are great and where means of transport are often comparatively slow, ample notice should be given of the despatch of stock; and when the stock are despatched, especially stud stock, the breeder should see to it that all pedigrees, prize records, and other information are promptly supplied.

Answers to Correspondents.

BOTANY.

Replies selected from the outgoing mail of the Government Botanist, Mr. Cyril White, F.L.S.:—

Swamp Mahogany.

A.H.H. (Byron Bay, N.S.W.)—

Your specimen is *Tristania suaveolens* var. *Glabrescens*, a form of the Swamp Mahogany. The tree is fairly common in Northern New South Wales and coastal Queensland, and is generally regarded as the most important timber for piles in sea water. Your specimens only differ from the normal form in that the leaves are smooth and not hairy, hence the name var. *Glabrescens*.

Gardenia Globosa—"Wedding Bells."

T.B.T. (South Johnstone)—

The flowering tree you call "Wedding Bells" is *Gardenia Globosa*, a small tree that rather likes shady situations in the garden, and bears large white bell-shaped flowers, but we cannot be sure of this, as other trees are known as "Wedding Bells," for instance, *Datura Arborea*, which bears long, pendant, white flowers about 6 inches long. The former is harmless but the latter is poisonous.

Hairy Indigo—Rattlepod.

R.M.F. (Mundubbera)—

The plant with small pods and red flowers is *Indogofera hirsuta* or Hairy Indigo, a very common weed in Queensland, mostly found on waste land, but also fairly common in places of ordinary pasture country. It is not known to be poisonous in any way. Besides Queensland, it has a wide distribution in other countries going from Malaya to India.

The plant with large velvety pods is *Crotalaria juncea*, a species of Rattlepod. Like the other plant it has a wide distribution, and though nothing definite has been proved against it, it belongs to a dangerous genus, which contains other plants, both here and abroad, known to be poisonous to stock.

"Bullock's Heart."

F.F.L. (Calliope, Boyne Valley)—

It is rather hard to name specimens from leaves alone, but we should say there is no doubt your tree is the "Bullock's Heart" (*Anona reticulata*), a plant of the custard apple family (Anonaceæ). It is a native of tropical America, but is widely cultivated in the tropical regions of the whole world. It is only occasionally seen in North Queensland gardens. The fruit is sweet, but insipid, and is not to be compared with the common custard apple. This tree is really the common custard apple of most parts of the world, the fruit known in Australia as custard apple being known abroad as sweet sop. We should say that Calliope is altogether too cold for the fruit to set.

Mukia scabrella—"Potato Bush."

W.C. (Biloela)—

The small climber with red berries is *Mukia scabrella*, a plant fairly common in different parts of Queensland, but for which we have not heard a common name. It is a member of the *Cucurbitaceæ*, and, though little is known of the properties, some of its allies are very poisonous, particularly the berries, and on this account the plant should be destroyed where it is found growing.

The plant with large green berries is a species of *Solanum* or "Potato bush." This genus is a large one, and the specimens do not allow of specific determination. However, most of the species bearing green berries possess a poisonous property, Solanine. On this account the plants must always be looked upon with suspicion.

Fungus.

P.J.S. (Quilpie)—

Mr. H. A. Longman, Director of the Queensland Museum, has handed us the specimen of a fungus from you. It is a fungus of the Family *Polyporaceæ*, which includes the common Shelf or Bracket Fungi, found on trees and logs. The one you send we should say is *Fomes lucidus*, fairly common in coastal Queensland on dead timber and at the base of trees. It takes many forms, and the finding of the plant so far west is of great interest, and the specimen makes a valuable addition to our Museum collections. Some species of the *Polyporaceæ* are extremely hooflike, and on this account are known as Hoof Fungi.

Flannel Weed.

J.G.G. (Cooroy)—

Your specimen is *Sida cordifolia*, the Flannel Weed, a common weed widely spread throughout the tropics of the world. It is a great pest around some of the towns and townships of North Queensland, and for some years past to a minor extent in Southern Queensland, but in the last season it seems to have spread considerably. It has very little value as a fodder, though quite wholesome; the hairy nature of its leaves and the fibrous nature of its stems making it of very slight value. Regarding eradication, in small areas hand pulling is of course the most effective. In larger areas, cutting off below the surface of the soil, or, where the land is not wanted for some little time, spraying with any of the commercial weed killing preparations should prove successful.

Poison Peach.

J.H. (Miriam Vale)—

No. 1 is *Trema aspera*, the common Peach Leaf Poison Bush or Poison Peach. The leaves of this shrub at times develop a prussic acid yielding glucoside, and if eaten in quantity then may cause trouble. The plant is also supposed to cause trouble through the indigestible nature of its fibrous twigs, bus possibly its dangerous tendencies have been much over-rated, as at times stock eat large quantities of Poison Peach without apparently any ill effects following.

No. 2 is *Pipturus argenteus*, a shrub or small tree common in coastal Queensland, and not known to be poisonous in any way though closely related to the Poison Peach.

No. 3 is *Trema orientalis*, a small to medium-sized tree fairly common in coastal Queensland, from Bundaberg northwards. It is related to the common Poison Peach, but is not known to be poisonous in any way.

Sheep Manure as a Fertiliser.

R.W.S. (Woombye)—

Your inquiry regarding the value of sheep manure as a fertiliser was referred to the Agricultural Chemist, Mr. J. C. Brünnich, who advises:—"Sheep manure varies enormously in its composition, but is generally of poor fertilising value, only worth about £1 3s. per ton, and would hardly pay for freight and other charges. The results of using such manure have been very disastrous, as it introduces a large number of weeds in pineapple and banana plantations."

PIG RAISING.

Replies selected from the outward mail of the Senior Instructor in Pig Raising, Mr. E. J. Shelton, H.D.A.:—

Production of Good Types.

A.C. (Tolga)—

There is no reason why grain or greenstuff plus mineral matters and water should not be beneficial in producing good type pigs, but it would require some system to keep up a continuous supply of food in your district during the dry spring months. Lucerne hay may be fed to pigs to advantage, but it is sometimes necessary to feed it in a soaked condition at the start to get the animals accustomed to it, particularly breeding sows, and it

is to them specially we advise feeding the more bulky foods. Peanuts are good for very young pigs, but should always be omitted from the rations of fattening pigs.

Pig Ailments.

H. (Clifton)—

Many pigs suffer each year from respiratory troubles (coughs, colds, pneumonia, pleurisy, &c.) as a result of neglect in housing and through being kept in low-lying damp or even wet muddy yards and cold draughty pens, in which there is no bedding and in which dust, dirt, mud, &c., accumulate. Cough in pigs is often an infectious complaint, especially among very young pigs that are not thriving as well as they should. In treating pigs for these complaints it is well to understand that a cure cannot be expected merely from the administration of medicine, in fact it is very risky administering medicine to pigs with affections of the throat and lungs, consequently the objective should be first of all to clean up the pens and yards, provide clean dry accommodation, roomy grazing areas, and good succulent herbage grass, together with an abundant supply of clean drinking water. The next step is to provide a good variety of foods, and balanced rations. It pays to warm the food given to pigs during cold and wet weather, especially to young pigs. The use of cod liver oil in tablespoonful doses daily to each of the pigs that are sickly is recommended, and it would pay you to secure a gallon or two of this oil from wholesale druggists. Provide charcoal and bonemeal, and as an addition we advise the use of small quantities of lime water to the food. This is not an expensive item, and its provision need not necessarily mean much extra labour. It is advisable to isolate all such pigs from the healthy ones, and to give the sickly stock very special attention.

Feeding Pigs.

H.J.T. (Nambour)—

Our experience has been that it does not pay to feed an excess of any particular food whether it be stored or fresh food, or even milk or grain. The best results are obtained when balanced rations are fed, and this can only be attained by a combination of such rations. For instance, maize is a fattening food, it has very little protein or flesh forming value, and pigs fed entirely on maize are liable to develop paralysis and similar diseases and be slow growers. On the other hand, lucerne is a nitrogenous (flesh forming) food, but lucerne will not fatten to anything like the same extent as is the case where lucerne and grain are fed in combination. Ripe bananas are a fattening food, but will only be of use where they are fed in conjunction with flesh-forming foods, such as lucerne, &c. A good water supply and mineral matters like charcoal, bonemeal, &c., are essential, while attention to the accommodation of the animals, and the provision of suitable grazing areas and clean dry sties are equally necessary to the success of any branch of stock raising. This does not indicate that expensive accommodation and a large capital are necessary before one can venture into the business.

The Agricultural Chemist (Mr. J. C. Brünnich) remarks in reply to your other inquiries.

1. A good stock lick for the North Coast District is made up by mixing 33 lb. of coarse salt with 66 lb. of Nauru phosphate (finely crushed). After mixing moisten with a little molasses.

2. Waste bananas should only be fed to pigs when ripe, green bananas would be dangerous. The feeding value would be about the same as sugar beets, swedes, or turnips.

If you like the "Journal," kindly bring it under the notice of your neighbours who are not already subscribers. To farmers it is free and the annual charge of one shilling is merely to cover postage for the twelve months.

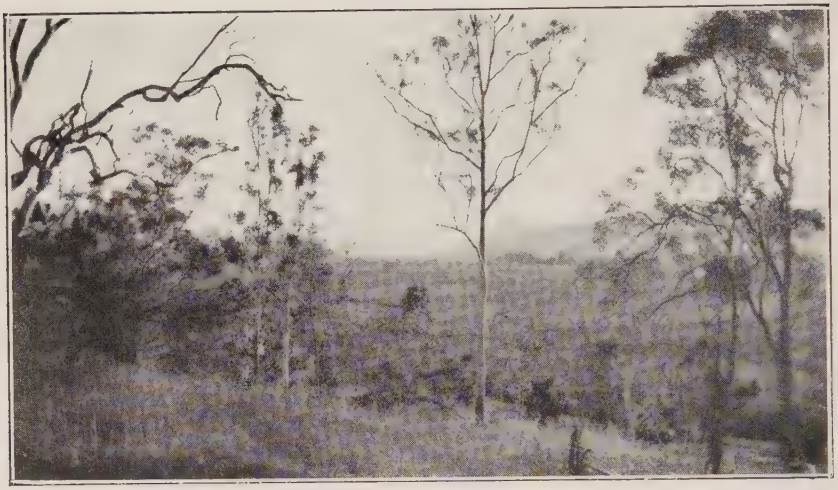


Photo.: Jean Easton.]

PLATE 126.

Evening draws her mantle slowly o'er a prosperous land.

Photo.: Jean Easton.]

PLATE 127.

Coochin Coochin, one of Queensland's historic Station Homesteads.

General Notes.

The Royal Society of Queensland.

The Ordinary Monthly Meeting was held in the Geology Lecture Theatre on 29th April, 1929.

The President, Professor J. P. Lowson, was in the chair, and about thirty members were present.

Miss D. Hill, B.Sc., Miss N. Holdsworth, and Mr. L. F. Mandelson, B.Sc., Agr., were nominated for ordinary membership.

Dr. F. W. Whitehouse exhibited the following fossils:—(1) Flowers of *Williamsonia*, associated with the fronds of *Ptilophyllum*, from the Jurassic deposits (Walloon series) of Bymount, north of Roma; (2) Specimens of a new species of *Calceola* from the Devonian beds of Ukalunda, North Queensland (collected by Mr. J. H. Reid; (3) *Stringocephalus* sp. from the Devonian limestone of Calcium, North Queensland. *Calceola* and *Stringocephalus*, index genera of the Eifelian and Givetian, respectively, of Europe are thus recorded for the first time from Australia.

Dr. W. H. Bryan exhibited some rather rare rocks from Milford Sound, New Zealand, which had been presented to the University of Queensland by Dr. P. Marshall. The rocks comprised Harzburgite (Saxonite), Dunite, Enstatite, and a perfectly white olivine-carbonate rock. Specimens of Dunite and Harzburgite from the type areas were also shown for purposes of comparison. Mr. D. A. Herbert exhibited (*a*) *Hydrodictyon reticulatus* from Lake Manchester; (*b*) *Craterium confusum*, a myxomycete from Wooloowin; (*c*) *Ustilago violacea*, a smut fungus attacking *Carex pseudocyperus* from Kuraby; and (*d*) a French bean showing polyembryony. The first three are new records for the State.

Mr. A. K. Denmead exhibited a small fossil identified by Mr. R. A. Keeble as belonging to the family *Diplograptidæ*, from Brisbane schists (Middle of Bunya series), of Tweed Heads. The age was considered to be Top of the Ordovician or Lowest Silurian.

Mr. J. E. Young exhibited a piece of coral containing a crab-gall produced by the female of *Haplocarcinum marsupialus*.

Mr. C. T. White exhibited specimens of (1) *Ficus Baileyana* Domin. from trees growing in Botanic Gardens, Brisbane. This tree was originally named by F. M. Bailey as *F. macrophylla* Desf. var. *pubescens*, and is related to *F. macrophylla* Desf. on the one hand and to *F. rubiginosa* Desf. on the other, but is distinct from either and seems worthy of specific rank. It is common in cultivation, and specimens are to be found growing in the Botanic Gardens at Brisbane, Sydney, and Adelaide. Both Bailey and Domin record it for the rain-forests of South Queensland, but this, Mr. White thinks, is pure guesswork, as though common in cultivation the plant has not as yet been found in a wild state. Specimens of *F. macrophylla* Desf. and *F. rubiginosa* Desf. were also shown for purposes of comparison; (2) Specimens of a small tree belonging to *Eucalyptus* or allied genus growing on sandy hills at Plunkett. The exact botanical position of this tree is a matter of doubt until flowers have been collected.

Mr. J. B. Henderson exhibited an Analytic Quartz Lamp. This is a mercury vapour lamp so fitted with two Wood's filters that ultra-violet rays are projected horizontally and vertically. The vertical rays fall inside movable black curtains, so that specimens may be examined for fluorescence in daylight. The effect of the ultra-violet rays was shown on various drugs and chemicals, also on papers, minerals, and precious stones.

Mr. C. Morton exhibited specimens of Rutile (red) surrounded by a zone of Ilmenite (black) in rounded as well as roughly crystalline forms up to 2 inches in maximum dimensions. They were obtained from shallow alluvial deposits near the Burrandowan road, about 22 miles west of Kingaroy. The country rock is gneissic granite, in which similar specimens were found to occur as isolated individuals.

Dr. E. Marks exhibited two rocks, a trachyte and a tuffaceous conglomerate found at Upper Brookfield.

Dr. Whitehouse, Dr. Bryan, Dr. Marks, and Messrs. White, Jackson, Massey, Denmead, and Jones commented on the exhibits.

The following officers were elected at the Annual Meeting of the Royal Society:—President: Professor J. P. Lowson, M.A., M.D.; Vice-Presidents: Professor T. Parnell, M.A. (*ex officio*) and Mr. J. B. Henderson, F.I.C.; Hon. Secretary: Mr. F. A. Perkins, B.Sc. Agr.; Hon. Librarian: Mr. W. D. Francis; Hon. Treasurer:

Mr. E. W. Bick; Hon. Editors: Mr. H. A. Longman, F.L.S., C.M.Z.S., and Dr. W. H. Bryan, M.C.; Hon. Auditor: Professor H. J. Priestley, M.A.; Members of Council: Dr. C. D. Gillies, M.B., B.S., M.Sc., Professor R. W. Hawken, B.A., M.E., M. Inst. C.E., Mr. D. A. Herbert, M Sc., Dr. T. G. H. Jones, A.A.C.I., Mr. R. Veitch, B.Sc.

Mr. W. G. Wells was nominated for ordinary membership and Mr. C. Schindler for associate membership.

Professor J. P. Lowson was inducted to the position of President for 1929. Professor T. Parnell delivered his Presidential Address entitled "Modern Developments of Physical Science." On the motion of Professor R. W. Hawken, seconded by Mr. J. B. Henderson, a vote of thanks was accorded the retiring president for his address. A paper by Dr. T. G. H. Jones and Mr. F. B. Smith, B.Sc., on "The Volatile Oil of Queensland Sandalwood" was laid on the table. Mr. H. A. Longman expressed the Society's appreciation of the presence of His Excellency the Governor.

Staff Changes and Appointments.

The following transfers of District Inspectors and Inspectors of Stock have been approved:—

District Inspectors of Stock.—Messrs. W. R. Holmes, from Townsville to Warwick; J. J. Ashe, from Mareeba to Townsville; E. C. Lake, from Bowen to Mareeba.

Inspectors of Stock.—Messrs. J. B. Cardno, from Nanango to Bowen; J. Bishop, from Kingaroy to Nanango; W. Ford, from Boondooma to Kingaroy; L. P. Doyle, from Julia Creek to Camooweal; E. T. Lewin, from Toowoomba to Cloncurry; S. C. Allan, from Helidon to Julia Creek; S. J. Monaghan, from Crow's Nest to Toowoomba.

The position of District Inspector of Stock and Brands, Bowen, has been abolished.

The position of Manager, State Nursery, Bribie Island, has been abolished, and Mr. T. R. E. Mitchell, Manager, State Nursery, Bribie Island, has been appointed Acting Manager, Pawngilly Banana Experiment Station.

The designation of the positions of the following Officers of the Field Staff of the Department of Agriculture and Stock have been changed to "Instructors in Agriculture" and such Officers have been appointed Instructors in Agriculture:—

Messrs. O. L. Hassell, Assistant Instructor in Agriculture, Atherton; W. H. Bechtel, Acting Assistant Instructor in Agriculture, Kairi; S. M. Smith, Agricultural Field Assistant, Brisbane; R. A. Tarrant, Agricultural Field Assistant, Atherton; W. R. Straughan, Agricultural Field Assistant, Rockhampton; and A. Hamilton, Agricultural Field Assistant, Townsville.

Mr. Bechtel will continue to perform the duties of the position of Manager, State Farm, Kairi.

The designation of the position of Senior Field Assistant, Cotton Section, held by Mr. N. E. Goodchild, Maryborough, has been changed to "Instructor in Cotton Culture" and Mr. Goodchild has been appointed to that position, at Maryborough.

Mr. E. Pickering, of Eumundi, has been appointed Chairman of the Honey Board, and Mr. S. J. Howe, of Woombye, Chairman of the Strawberry Board.

Mr. C. R. Noyes has been appointed Chairman of the Moreton Local Sugar Cane Prices Board during the absence of Mr. S. L. Stormonth, and Mr. S. Pagano has been appointed Canegrowers' Representative on the Mourilyan Local Sugar Cane Prices Board, vice Mr. J. F. McCutcheon, resigned.

Constable C. W. Allen, Ravenshoe, has been appointed Temporary Acting Inspector of Stock whilst he is stationed at Ravenshoe, and has also been appointed Inspector of Slaughter-houses.

The appointments of Messrs. M. Flanagan (Bundaberg), F. A. Johnson (Willowburn), A. Black (Oxley), and W. L. Conn (Murarrie) as Inspectors of Slaughter-houses, have been confirmed as from 16th November, 1928, 19th November, 1928, 19th November, 1928, and 29th November, 1928, respectively.

Messrs. J. Macfie (Pomona), H. Lambert (Woombye), and R. J. Rollston (Brisbane) have been appointed Assistant Inspecting Cane Testers for the forthcoming sugar season, with headquarters at Cairns, Mackay, and Bundaberg, respectively.

Acting Sergeant S. J. Selby, of Babinda, has been appointed Inspector of Slaughter-houses.

Mr. W. Gibson has been appointed Millowners' Representative on the Bingera Local Sugar-cane Prices Board, vice Dr. A. J. Gibson, resigned.

The services of Mr. J. C. Pryde, as Temporary Inspector of Slaughter-houses at Toowoomba, have been continued for a further period as from 12th May to 11th July, 1929, during the absence of Mr. Tanton on sick leave.

Mr. J. L. Hodge, of Hendra, Brisbane, has been appointed Instructor in Sheep and Wool, on probation for a period of six months.

Messrs. E. C. Dunn (Taabinga Resumption, via Kingaroy) and J. J. Shelvey (Hendra, Brisbane) have been appointed Inspectors of Stock, on probation.

Successful Science Students.

Among the successful students at the last examinations of the Faculty of Science of the Queensland University were Mr. E. J. Ferguson Wood of the Bureau of Sugar Experiment Stations, Department of Agriculture, who obtained his degree of Master of Science, and Mr. W. A. T. Summerville of the Division of Entomology, Department of Agriculture, who obtained his degree of Bachelor of Science. Both students are young Queenslanders with very creditable Departmental and academical records, and are already well known to readers of the Journal as contributors on science subjects.

The Minister at Kilkivan.

The Hon. Harry F. Walker (Minister for Agriculture), in opening the Kilkivan Show on 29th May, complimented the ladies on their very fine displays of fancy work and culinary. He was impressed with the quality of the farm produce, which showed the progress made by the district in recent years in those lines, and he suggested that samples of the potatoes and maize should be exhibited in Brisbane. He eulogised the work of the students in the technical classes in the Rural School. Dealing with the dairy stock, Mr. Walker said that he had been informed by the judge that the Jersey bull shown was one of the best in Queensland. It was a great tribute to the breeder. There were also nice bulls in the Ayrshire and I.M.S. classes. The breeders were doing a great work for the whole of Australia, as by the improvements of herds and conservation of fodder they must increase their quota of exports.

Royal National Show—Ground Improvements.

A meeting of the Council of the Royal National Association was held on Thursday, 30th May. The chairman (Mr. J. Hiron) presided.

The acting secretary (Mr. H. W. Watson) reported that great general progress had been made in organising details as affecting the 1929 show. The district shows held during the month, many of which had been visited by representatives of the Council, had been attended with great success, and, what was of most importance, the general quality of exhibits in live stock and agricultural produce showed considerable improvement. The Royal National Association was now within ten weeks of the annual show, and, as it was possible to estimate more definitely what the possibilities were, he was confident that the 1929 effort would register that step forward which had most regularly marked efforts during more recent years.

The ground improvement programme outlined by the Council at the commencement of the present financial year had been steadily proceeded with and the wages sheet of the association exceeded £1,500 per month, exclusive of the heavy contract work which had proceeded during this period. The beef cattle and pig pavilions were now complete. The new concrete wall formation had been completed and was receiving its rough cast finish. The demolition of the old smokers' stand and adjoining buildings and the substitution of the fine wall and the building up of the rampway was regarded as one of the finest improvements to the grounds effected by the Council. Extensions had also been made to several of the refreshment rooms and greater facilities provided in connection with this most important service of providing the public with the necessary refreshments. The roads in No. 2 area had been raised to the extent of 2 feet and the centre and dry walk-ways in this area should now hold in any weather.

The motor pavilions, which the association was providing for the housing of motor exhibits, were in a state of preparedness, and it was recognised that the 1929 Royal National Show would see the greatest motor show yet staged in this State, covering some 60,000 square feet. The erection of the new fruit and horticultural pavilion was the last of the heavy improvements to be effected in preparation for the 1929 Show. The report was adopted.

Sugar Assessments.

The Sugar Assessments for the forthcoming sugar season have been fixed as follows:—Assessment under Regulation of Sugar Cane Prices Acts—1¼d. per ton on every ton of sugar-cane received at mills. Assessments under Sugar Experiment Stations Acts—1d. per ton on every ton of sugar-cane received at sugar works. Cane Pest Boards Assessments—Plane Creek, 1d.; Mackay District, 1d.; Lower Burdekin, 2d.; Tully, 1½d.; and South Johnstone, 2d.

Citrus Levy Regulations.

These Regulations have been further amended to provide that, after the 12th April, 1929, the levy shall be at the rate of 2d. per bushel case, 1d. per half bushel case on all citrus fruit marketed, and 8s. per ton payable on all citrus fruit sent forward to canners, &c. The proceeds of this levy shall be expended half in the interests of the citrus fruit section of the fruitgrowing industry of Queensland and the balance only upon advertising in the interests of the growers concerned. The Regulations will be effective until 31st December, 1929.

A Bright Fruit Journal.

It used to be known as "Nicko's," the nick-name of its founder, that great-hearted and good Australian, George Nicklin. Then it was called "The Australian Fruitgrower, Fertiliser, and Poultry Farmer," and now, having bought itself a new overcoat, it has become "The New Australian Fruitgrower." At all times it is one of the cheeriest and brightest of our exchanges, and still wears its friendly grin and carries a warm shake or a hard punch in either hand. Its shake is preferred to its punch, but even that is delivered in a truly sporting way and always with a kindly smile behind the "hand-out." On every page is a glint of Queensland sunlight, brightening the wisdom and counsel of its columns. Like the industry it serves it is all-Australian in production. As a journal for the fruitgrower it compares favourably with any of our exchanges, and it should find a ready welcome on every orchard.

French Honour for Departmental Officer.

Count Gontran de Tournouer, B.Litt., Departmental Librarian, has been awarded the honour of Chevalier of Agricultural Merit, on the recommendation of Marshal Petain, in recognition of his services to General Pau's Mission to Australia. Count de Tournouer also received recently the decoration of Officier d'Academie from the French Government as a recognition of other services. He has been for a number of years a regular and able contributor to French and other periodicals on agricultural and kindred subjects. Prior to enlisting with the Australian Imperial Force, with which he served on Gallipoli, in Egypt, and in France, Count de Tournouer was engaged in the sugar and grazing industries in Queensland. He has travelled extensively in little known countries and, besides being a very fine linguist, is a gifted and versatile writer, and his stories and sketches have brightened the pages of several Australian journals. Count de Tournouer is a good Australian as well as a distinguished son of France.

Points in Planting Fruit Trees.

The roots of deciduous trees commence growing in the spring long before there is any move in the tops, and it is an advantage for the trees to be in their permanent positions when this first root movement takes place. Early planting, say, June and early July, is therefore advocated. The soil must not be too wet, of course, or it may become puddled.

Well-grown trees, one year from bud or graft, with well-developed roots are preferable. Long roots are very troublesome to settle satisfactorily when planting, and it is better to cut them back to about 8 inches. The bottom of the hole should have a crown in the centre so that the roots can be spread out with a downward tendency.

It is most important that the fine soil be rammed well in with the heel to bring it in close contact with the roots as the hole is filled in. The top of the hole should be left loose to act as a mulch. If planting when the soil is dry cannot be avoided, the holes should not be completely filled, and each tree should receive 8 or 9 gallons of water; when that has completely soaked away the hole should be filled up with dry, loose soil. A watering in this way is very useful in settling the soil around the roots, but care should be taken to avoid tramping close around the tree while the soil is soaked. The tree should be cut back to the desired height after planting.

A South Coast Sanctuary.

Previous Orders declaring sanctuaries in the Southport and South Coastal districts have been revoked and a further Order in Council has been approved, declaring the coast from the mouth of Coomera River to Point Danger and inland for a depth of two miles, to be a sanctuary for animals and birds. This area includes the town of Southport and the islands situated between Stradbroke and the mainland.

Open Season for Wild Ducks and Geese.

By an Order in Council the open season for wild ducks and geese in the No. 2 district of the State, which was declared by a recent Order in Council, has been varied. That Order in Council declared the open season for the whole of No. 2 district, to operate from the 1st June to the 31st October, but it has now been decided that so far as that portion of No. 2 district, south of the 22nd parallel is concerned, the open season will extend from the 1st July to the 31st October next. This, in effect, will mean that a close season will be in force in the Rockhampton, Gladstone, St. Lawrence, Clermont, and intervening districts, until the 1st July next.

Pig Farmers' School at Gatton.

The syllabus arranged for the forthcoming school of instruction for pig farmers, to be held this month at the Gatton College by the Departments of Agriculture and Stock and Public Instruction, is a very comprehensive one, and includes the following lecture course:—

Subject.	Lecturer.
Agricultural Education Microbes Principles of Feeding	Professor J. K. Murray, B.A., B.Sc., N.D.D., Principal of the College.
Economic Phases of the Pig Industry Description of Breeds Design and Construction of Piggeries General Care of Pigs Judging Results of Cross Breeding Preparation of Pigs for Show and Market	Mr. E. J. Shelton, H.D.A., Senior Instructor in Pig Raising.
Weighing and Branding	Mr. John Hardcastle.
Fodder Crops	College Staff.
Anatomy Diseases of the Pig Improvement of Breeds Physiology Administration of Medicines Post Mortem Examinations	Major A. J. McKenzie, Lecturer in Animal Husbandry.
Commercial Pig Farming	Mr. R. G. Watson.
More Money in the Farmer's Pocket	Mr. J. F. F. Reid, Editor of Publications, Department of Agriculture and Stock.
Pig Hygiene	Mr. H. G. Cheeseman, Senior Slaughtering Inspector, Department of Agriculture and Stock.
Farm Book and Record Keeping	Mr. J. H. Woodward, Senior Clerk, Queensland Agricultural College.
Soils	The Principal, Technical College, Ipswich.
Disinfectants Tuberculosis in Pigs	Mr. C. J. Pound, Government Bacteriologist.
Marketing Pigs	A Representative of the Bacon Curers' Association.
Pig Clubs	The Organiser of Agricultural Projects, Department of Public Instruction.

Open Season for Opossums.

By an Order in Council an open season of one month for the capture and destruction of opossums has been declared in all districts in the State. This open season will extend from the 8th July, 1929, to the 7th August, 1929, both days inclusive.

In giving favourable consideration to the question, the Minister for Agriculture and Stock (Mr. Walker) announced that the Government was influenced by the fact that protection has been afforded since 1st September, 1927, and reports called for and received from reliable sources indicate that in a number of areas the opossum is again in large numbers, and in the majority of districts where they thrived prior to the last open season they are again fairly plentiful.

A factor which was also given consideration in opening the season was the desire of the Government to provide employment for those who wished to take advantage of an open season and who at the time might not be absorbed in industrial undertakings. It is anticipated that a considerable sum of money will be also put in circulation as a result of the proceeds of the sale of furs.

The limitation of the open season to one month should ensure, at the end of the period, that sufficient numbers of opossums are left for propagation purposes.

An indication of the value of the opossum fur industry may be gathered from the fact that during the open seasons in 1926 and 1927 a total of 3,500,000 skins was sold at a value of £832,000.

The Minister also stated that he has under consideration the adoption of measures for the propagation of the opossum, which will tend to create breeding grounds for these native animals in districts most suitable for the purpose. He hopes, in this way, to provide regular supplies, and to ultimately place the fur breeding industry in the State on a systematic and profitable basis.

New Objectives in Wheat-breeding.

Farrer achieved such wonderful success in wheat-breeding in Australia, particularly with his variety Federation, which is still grown largely in Victoria and New South Wales, that it was considered by many that the pinnacle had been reached, and that very little further progress could be made.

The work which has been continued by plant-breeders, writes the Director of Plant Breeding of the Department of Agriculture, New South Wales, has been rather in the direction of producing earlier varieties of high productivity, and both Canberra and Waratah are outstanding examples of the success of this objective. A change in the objectives in wheat-breeding, however, has necessarily been brought about in recent years through the increasing ravages of diseases, which take a heavy toll of the crop in some years. The present leading varieties—Federation, Waratah, and Canberra—all suffer from the effects of diseases in certain seasons and under certain conditions, while it is known that other varieties are not so badly affected. This indicates a varietal resistance or susceptibility which the plant-breeder must consider in the production of new wheats, if they are to be superior to the present varieties.

In his day, Farrer did not have to concern himself with breeding for resistance to flag smut, but this phase is now regarded as one of the most important objectives of the wheat-breeder. By keen observation, Farrer achieved a certain measure of success in breeding rust-resistant wheats, but in his time nothing was known of the specialisation of physiologic forms of rust, some varieties being resistant to some forms and susceptible to others, and Farrer could not, therefore, make the headway in this work, which is now being undertaken with a wider knowledge of the incidence and a better understanding of the inheritance of rust, and which, therefore, promises much greater success than Farrer achieved in this direction.

Other diseases are also being investigated from the varietal aspect to discover, if possible, whether any varieties have an inherent resistance which can be turned to account by the plant-breeder. Moreover, the wheat belt is extending each year into districts of more limited rainfall, and wheats of greater inherent drought resistance are needed than when Farrer was engaged in this task.

Though the task of the wheat-breeder has been rendered sterner and his problems more difficult since the time of Farrer, we can never detract from his wonderful work; firstly, because his Federation wheat has held pride of place for so many years, and, secondly, because many of the most promising varieties to-day in Australia still have a large mingling of Federation "blood."

Men and Machines.

"There could be no more false, no more mistaken view," said Lord Londonderry in a speech at Newcastle, England, recently, "of the needs of industry to-day than the over-emphasis upon the present age as the mechanical age, in which the human element in manufacture has been practically eliminated, and the operative reduced to a mere machine-minder. While it is true that science and machinery enter ever more and more into the creative processes, this has not meant, and, as far as I can see, never will mean, the replacement of human skill. It has only meant a shifting, not a lifting, of the burden upon man. It has necessitated a greater use of the intelligence of the worker, and a smaller demand upon him for actual manual dexterity. Man himself still remains the most wonderful machine in the world, and, though his muscles may be called upon less and less, his mind, his intellectual powers, are being called into service more and more every day."

Wintering Conditions for Bees.

The provision of good wintering conditions, by enabling the worker bees to conserve their energy, has an important influence on the honey-producing capacity of a colony.

The length of life of worker bees is governed by the energy they put into their work. For instance, during a honey flow, when the condition of the colony is normal, with young bees hatching freely, the bees put so much energy into their work that they become quite aged and usually succumb in six or seven weeks. If, on the other hand, any abnormal condition (such as the loss of the queen) takes place, then to some extent the bees will conserve their energy so that their lengthened life will give the colony a chance to recover. The period at which this conservation of energy is most desirable is during the winter, and it is at this season that the apiarist himself may help.

If wintered in a good hive with ample stores under favourable conditions, the young bees of a populous colony will come into spring with comparatively undiminished energy, so great is their power at this period of conserving their vitality. The case of a colony in a low-class hive, which has excessive space or insufficient stores, or which allows a draught through the cluster, is very different. The draughty state of the hive necessitates considerable activity on the part of the bees in order that the temperature may be maintained, and the extra energy expended shortens their lives proportionately. Insufficient stores cause the bees to economise and consequently lowers their vitality still further.

Points in Packing.

Use a clean case with stout sides and flexible tops and bottoms.

If making cases, use nails of sufficient length and gauge to hold the boards.

Grade carefully for size and quality.

Avoid using an open edge pack where possible. Use a closed edge pack for first preference, and a flat pack for second preference.

Handle the fruit with extreme care—remember that much damage is caused by common rot organisms which gain entrance through a broken skin. Use a wrapper of sufficient size to completely cover the fruit, and finish the wrap over the stalk so that it will form a pad and prevent the stalk protruding through the paper and puncturing the apple next to it.

A little wood wool placed on the bottom of the case and on the top of the last tier protects the fruit.

To prevent cleats from splitting soak them in water before using.

Finish the pack with a slight bulge.

Do not pack slack—it causes bruising.

Do not place the case flat on the floor when nailing it down. Place battens underneath or use a nailing-down press.

The wiring of cases is strongly recommended; they increase the stability of the box. When wiring, the machine should be placed on the side of the case. The wires should be placed near the cleats at each end of the case.

Use a well-designed attractive label.

Mark your cases in accordance with the grading regulations. If using a stencil, see that the markings are easily decipherable. Plain, attractive markings facilitate handling of fruit and are of great assistance to both buyer and seller.

Do not walk over cases.

Sweep out trucks before loading the fruit, and stack cases on their sides, not on the bulge.

Dipping of Lambs—A Southern Trial.

The results of dipping trials at Bathurst Experiment Farm (New South Wales) this season confirm those of previous experiments, demonstrating that dipping has no detrimental effect on the growth of lambs if properly carried out.

Fifteen lambs were selected and divided into three equal lots. One lot was dipped in a carbolic dip, one in an arsenical powder dip, and the third lot was left undipped as a check. Fairly small lambs were selected so that they would not be sold in the first draft that went to market. The lambs were weighed prior to dipping (5th December) and again on 9th January, with the following results:—

	Weight, 5th Dec.	Weight, 9th Jan.	Increase.
	lb.	lb.	lb.
Carbolic Dip ..	64.2	77	12.8
Arsenical Dip ..	65	72.8	7.8
Undipped ..	64.4	74.6	10.2

Sheep should not, of course, be dipped when in an overheated condition, but lambs will naturally rush about more than older sheep. In trials carried out previously at Glen Innes Experiment Farm, lambs that had been driven around the yards until they were hot and breathing very quickly and then put through the dip showed no ill effects in their general appearance, and an average increase in weight of 12¾ lb. in five weeks was recorded. In some cases a slight difference, not amounting to a break, was subsequently noticeable at that part of the staple which would have been at the surface of the skin at time of dipping.

Worms in Sheep—An Effective Drench.

The efficacy of the copper sulphate and mustard drench for treatment of stomach worms in sheep has frequently been referred to in these notes. As the trouble is one which is occupying the attention of a good many sheepowners at present, details of the drench and method of administration are repeated.

To prepare the drench dissolve 4 oz. of powdered copper sulphate (bluestone) in a pint of hot water, using an enamel or earthenware dish. When thoroughly dissolved, add 4 oz. of mustard. Then add cold water to make up to 1½ gallons, using an enamel bucket or earthenware jar. This will be enough for 100 adult sheep, allowing for waste. The doses of the mixture are—

	Ounces.
Grown sheep (4-tooth and over)	2
One-year-old sheep (2-tooth)	1½
Lambs	1

If it is desired to use a weaker solution, the drenching mixture may be made up by taking the drench as prepared above and adding an equal quantity of water. The doses would then be 4 oz., 3 oz., and 2 oz., respectively.

Instead of the ordinary galvanised drenching tins, those made of sheet copper are to be preferred, as the action of bluestone on galvanised iron is highly corrosive, and such tins wear out very rapidly. Three different sizes of drenching tins are required to hold the respective doses mentioned above.

It is advisable to bring the sheep into the yards the night before, and to drench after a preliminary fast. No water should be allowed for two hours after drenching. The sheep should be drenched in the standing position, with the head held horizontally or slightly raised. The head must not be forced far back, or the drench given hurriedly, otherwise choking may result, or some of the liquid may enter the lungs and set up pneumonia.

Drenching should be repeated in about fourteen days' time, and again if necessary one month later if the best results are to be obtained. On properties where worm infestation is serious, regular systematic drenching should be adopted. It must be remembered that drenches simply destroy and expel the parasites, and do not render sheep immune. Thus the sheep will become reinfested by the many thousands of ensheathed larvæ still present in the pastures. By repeated drenching, say, at monthly intervals, these young parasites are destroyed as they get into the sheep, and before they are able to propagate to any extent. Thus by regular drenching it is possible to clear up the parasites in wormy areas.

Regulating Dairy Production.

The desirability of "evening up" production throughout the year, and how it might be accomplished, was discussed by Mr. E. H. Filmer at a recent conference of South Coast (New South Wales) farmers.

By having, say, 10 per cent. of the cows calving every month, it was contended there would be a continuity of supply of fresh cows in the herd and a more steady flow of production, providing there was a supply of good feed, natural or conserved, all the year round. By such a distribution of production throughout the year the price obtained would be made more even and perhaps a shade improved. As things were, if the season was good a large percentage of the dairy farmer's product was exported, and returns were not always as good as the local prices. When winter came they found that butter was imported from other States. It was rather galling at times after exporting their so-called surplus at a loss on local prices to find that they had to import butter at a higher rate to fill requirements.

Another method of regulating the dairy herd was to keep the sire from the cows until, say, November or December, and then get them all in calf in a month or six weeks, and thus have them calving in September and October. By this means the whole herd would be dry during July and August, thus giving the farmer time to do some other work or to take a well-earned holiday. Further, the cows were dry at the least productive period (on natural pastures). The disadvantages of this system if generally practised would be over-production during spring and summer, necessitating export or storage, and a tendency to reduce the price, also the fact that butter factory plants and staffs would be idle, and he did not think that the inevitable dislocation all round would be in the best interests of the industry.

Another disadvantage would be that in a fair-sized herd of, say, sixty cows the farmer would probably have to keep two or more bulls. Added to this there was the fact that for ten months in the year the bulls were idle, and it was very probable if they did not become a nuisance to their owner that they would do so to his neighbours. Again, most cows when in season caused unrest among the remainder of the herd, which did not make for smooth and quiet working, and conditions in this respect would be proportionately worse.

He much preferred the first method. There was no two or three months holiday in it as against the second one, but once one got it going it made for smooth working, even production, and regular cheques.

Surplus Combs—Fumigation for Wax Moth.

When combs have to be stored for any length of time care should be taken to prevent damage by the wax moth larvæ, for such combs are of great value for future development in the apiary. Bees will store honey in combs at times when they will not build out comb foundation.

As the pest is not so troublesome during the winter months, the removal of one comb from each body and the piling up of the bodies on four tins, so as to prevent damage by mice, will usually suffice as a protection. No cover or bottom board should be used, so that air may circulate through the pile freely. The room in which the bodies are stored must be bee-proof, to prevent any robbing by bees. Some apiarists place a wire cloth screen top and bottom of the pile. The combs should be examined about once a month during the winter, and any showing signs of infestation should be set aside for fumigation.

The piles should be treated in the following manner:—First scrape all propolis from the top and bottom edges of the supers, in order that the bodies may fit tightly and thus retain the gas. On top of each set of combs place a cloth about 10 inches square (doubled) and over this pour a tablespoonful of carbon bisulphide. Cover the cloth with two thicknesses of newspaper to ensure a tight joint, and place another body on top and treat in the same way, and so on with the remainder of the pile.

Great care is necessary in using carbon bisulphide, as it is a poisonous and very inflammable gas. Fumigation is best carried out under a verandah or in the open; if the work is done indoors there should be ample opportunity for the free circulation of air if risk to the operator is to be avoided. On no account should a light of any sort be allowed in the vicinity of the gas, as a spark is quite sufficient to cause an explosion.

Sulphur fumes are quite effective for the fumigation of slightly infested combs. To fumigate by this method, prepare four or five bodies of combs, take a pan containing red-hot coals, throw on to the latter a handful of sulphur, immediately

place over the pan an empty full-depth super, then the bodies containing the combs, and finally place a good close-fitting cover over all. The combs can be left over the fumes for an hour.

The carbon bisulphide treatment is the more effective, and is recommended if combs have to be kept over a fair period.

During the early spring populous colonies of Italian bees will take care of a few of the surplus bodies and combs.

Very heavily infested combs should be melted up.

Silage is Real Money.

The market value of silage is not fixed, as is the case with hay. In nearly every case the fortunate farmer who possesses it regards it as of so much value to himself that he will not sell it. It has, however, a very definite market value. During a recent dry spell the manager of Wagga Experiment Farm (N.S.W.) was offered £8 per ton for pit silage. Considered from the point of view of its actual food constituents it may not be so valuable as hay, but its succulence is an important feature, and renders it of considerable value, particularly in a lean period, when succulent feed is the very class of which there is a special scarcity.

As farmers are beginning to appreciate, the security afforded by reserves of silage has a very real monetary value. The value of such a reserve is not merely its value as fodder—it is the value of the profits accruing from the enterprises which the reserve has made possible.

Better Pastures for Dairy Cattle.

If stock have access to succulent pastures they are less liable to become affected with such troubles as rickets, bone-chewing, &c., which are generally associated with poor pasturage. Much poor land will produce infinitely better feed if it can be broken up and sown with suitable grasses and clovers. On some of the country implements cannot be worked, but winter-growing plants, such as Wimmera rye, Italian rye, Perennial rye, Cocksfoot, Sheep's Burnet, and Subterranean clover can be scattered in suitable places on these areas, writes the Agrostologist of the Department of Agriculture.

By having numerous small paddocks, rather than a few large ones, a system of rotational grazing can be adopted, and by establishing some paddocks of winter grasses and others of summer pastures, each can be grazed at the time when they contain their maximum amount of nutritive material. The grasses and clovers can thus be handled in such a way as to enable them to rest, recuperate, and seed at the correct time, thus maintaining the maximum degree of efficiency in each. Attention should be given to sowing mixtures of grasses and clovers most suitable for the district, and particularly those which provide feed at those times of the year when the natural pastures are at their worst.

If the property is well subdivided, the pastures can be utilised when the feed is most nutritious. Milking cows require palatable feed rich in protein, and the grasses should be fed off when the growth is young, but as the plants mature the fibre increases and the percentage of protein diminishes.

The use of fertilisers, such as superphosphate, stimulates the growth of grasses and legumes, and the amount of mineral matter in the plants is increased, particularly the elements lime and phosphorus, which are essential for the animals' development. Stock grazed on pastures deficient in these substances invariably become "bone chewers," but by feeding the pasture with fertilisers, the composition of the plants is considerably improved. Where a marked increase in the lime content of the soil takes place, the percentage of nitrogen in the pasturage also increases.

Stock prefer top-dressed portions of a paddock to unmanured sections, because—(1) They are obtaining more lime and phosphorus (two substances essential to the building up and maintenance of the animals' framework), and (2) the top-dressed pasture is more palatable and nutritious, and contains a greater amount of protein, due, mainly (*a*) to the increased growth of clovers and (*b*) to the increased percentage of nitrogen present in the pasture as a whole.

Therefore, by nourishing the pastures, not only is a greater quantity of feed obtained, but a considerable gain in the nutritive value of the plant is effected.

The Home and the Garden.

OUR BABIES.

Under this heading a series of short articles by the Medical and Nursing Staff of the Queensland Baby Clinics, dealing with the welfare and care of babies, has been planned in the hope of increasing their health and happiness and decreasing the number of avoidable cases of infant mortality.

THE NATURAL FEEDING OF BABIES.

Every mother should realise how important it is that her baby shall receive his natural food—that is, his mother's milk. That milk has been supplied by Nature for that special baby, and is adapted to his special needs. Doctor Sir Truby King says, "A woman's milk is not her own. It is created for her baby, and the first duty of the mother is to ensure, by foresight, a proper supply of the only perfect food—the baby's birthright." Almost all mothers can feed their babies, if they desire to do so. If they have not a quite sufficient supply of milk for the baby's full needs, he must not be weaned on that account. Give him what there is, and finish his feeding with a little very slightly sweetened artificial food. At the same time try to increase the breast milk supply. This can and should be done. Any Baby Clinic nurse will show you how to do it. Even a little mother's milk is very valuable for the baby, and helps him to digest the artificial food which may be necessary. There are many reasons why breast milk is best for baby. As has been said before, it is his natural food, and contains in the right proportions all the food ingredients necessary for baby's growth and development.

Give the Infant a Good Start in Life.

The death rate among breast-fed babies is much lower than among artificially-fed infants. Statistics tell us that, of the babies who die in their first year, a large percentage of them are artificially fed. A breast-fed baby is much less likely to contract disease than one who is artificially fed, and, if illness is contracted, the baby fed on his mother's milk makes a quicker and better recovery than does the bottle-fed baby.

The child who is breast fed during his first year is stronger and healthier during his second year than the one who has been artificially fed.

The Wisdom of Mother Nature.

In addition to these advantages to the baby, there are advantages also to the mother's health. Besides this, mother's milk is always ready; there is no troublesome preparation of bottles and mixing of foods. Thus it is a great saving of time for the mother. It is always the right temperature, and is germ free. Also much money is saved that would, for the bottle-fed baby, have to be spent on infants' food, bottles, teats, bottle brushes, &c. So give baby what Nature meant him to have, his mother's milk, and leave cow's milk for the baby calf, for which it was intended. In addition to all of these reasons, the baby who is dependent on his mother for the food he receives is more devoted to her than the child who is satisfied to be fed out of a bottle, by anyone, and the mother more dearly loves the baby whom she has fed with her own milk. Some mothers wean their babies because they think they are not strong enough to nurse them. This is a mistake; the health of the mother is, in nearly all cases, improved while nursing her baby. Others think that their milk is poor in quality, because it is thin and watery looking. But analyses of many samples of mothers' milk have proved that this pale, watery-looking milk is quite rich in quality, and contains all the nourishment needed by the baby. Still others talk of "windy milk," and wean on that account, but wind is never drawn from the mothers' breasts. "Wind" in the baby's stomach is air that he has swallowed. Other frequently heard causes for weaning are frequent green motions, attacks of screaming after feeding, frequent vomiting, and loss of weight. These are nearly always due to indigestion caused by overfeeding, especially in the early days. Babies are often weaned because the mother thinks she is losing her milk. In many of these cases, inquiry elicits the fact that the mother is substituting one or more bottle feeds for breast feeds, or is "keeping the breast for the night," and bottle feeding during the day. There is no surer or quicker way of weaning baby

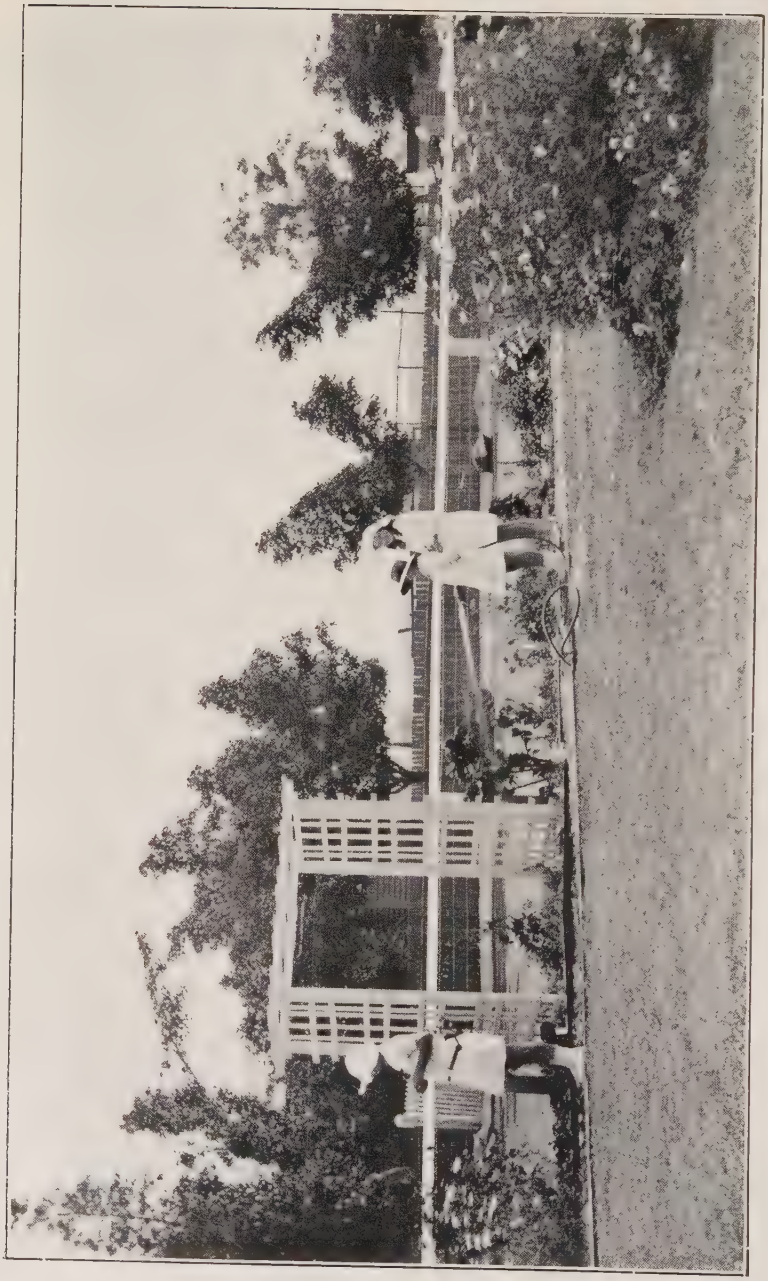


Photo.: Dept. of Public Instruction.]

PLATE 128.—IN A STATE SCHOOL GARDEN IN SUNNY QUEENSLAND.

than by these means. The best way of keeping up the supply of mother's milk is by the regular and vigorous sucking of the baby. Put baby to the breast every three or four hours during the day for from fifteen to twenty minutes. Give no night feeds from birth.

The Best Food for the New Australian.

Another mistake which is often made, and which may result in baby's refusal to take the breast, is feeding him on sweet foods, condensed milk for instance, during his first two days of life, before the mother's milk comes in. If that is done, baby gets used to the taste of the artificial food, which is sweeter than his mother's milk. He also finds that taking milk out of a bottle is easier than sucking. As a result he fights and protests when put to the breast, and refuses to suck. This may also happen if the new born baby is given a "dummy," especially if this is dipped in honey or any other sweet stuff. The mother is worried by this refusal, and, in consequence, her milk supply decreases. Also, because baby has not taken the breast, more of the artificial food is given to him, and as a result he is soon entirely weaned.

Babies should never be given artificial food during their first two days. Give them plain boiled water only. If they required feeding then Nature would have supplied the food.

TWELVE BEST GARDEN ROSES.

The following interesting paper was read by Mr. B. Watkins, B.Sc., M.Sc., president of the Horticultural Society of Queensland, before members of the society:—

The title of this paper is one which may lead to the belief that I am going to name twelve roses which are considered to be the best twelve garden roses. Such is not the case; it is my desire to discuss those roses which have some claim to inclusion among the best twelve. There is really no finality to the question of the best twelve garden roses Experience with roses differs. One rose grower will find a particular variety an assured success, and a second grower reports the same variety to be a failure. Such is the case with the rose Hadley. It is temperamental—successful in one quarter and only mediocre in another place. No one person can list twelve roses as the best twelve for Brisbane—a personal list is the result of one's experience. Yet by collecting as many such lists as possible from growers in and around Brisbane and dissecting them a fair average indication is the result. Such a plebiscite should be made from time to time by the society, and the results published for the guidance of beginners. Southern societies treat this matter seriously, and a valuable guide to varieties to grow results from the voting.

Some years back the Brisbane "Sunday Sun" called for an expression of opinion from its readers as to the best twenty-four roses. The result of the plebiscite was as follows:—Maman Cochet, White Maman Cochet, Hadley, Radiance, Penelope, Lady Hillingdon, F. K. Druschki, Madam Abel Chatenay, George Dickson, Mrs. Herbert Stevens, General Macarthur, Laurent Carle, K. A. Victoria, J. J. L. Mock, Madam Segond Weber, Rhea Reid, W. R. Smith, Lady Alice Stanley, Duchess of Westminster, Madam Constant Soupert, Columbia, Alexander Hill Gray, Perle des Jardines, Star of Queensland. Many of these varieties must give way to better varieties of recent introduction.

Whilst on the matter of a plebiscite, there is a further point that deserves consideration. One is apt to be rather partial towards a rose and allow such partiality to blur one's general outlook when considering the best twelve, resulting in a list of one's favourites rather than an impartial, unbiassed opinion of the best twelve. My favourite rose is Reverend F. Page Roberts, and perhaps next comes Betty Uprichard; yet I would never consider either variety worthy of inclusion in the premier twelve. It is my desire to be impartial and non-dogmatic in dealing with this subject.

A good garden rose is one that possesses vigorous, strong growth, carries its flowers erect on long straight stems well above the foliage. The foliage should be disease resistant, and not readily shed. The variety should be in constant bloom, and the blooms should be capable of holding together under the various climatic factors characteristic of the area. The colour should be lasting, and the flowers carry at least three rows of petals. Such a definition rules out all the single and semi-single varieties and many roses which, although favourites, bloom only at limited periods, such as George Dickson.

In the above review the first varieties claiming attention are that trio of worthy roses—the Radiance family. In 1904 J. Cook produced a new rose named Cardinal, from Liberty, and an unnamed red seedling. Liberty is a red rose still prominent in many quarters, particularly its climbing form. Its progeny, Cardinal, is at present not listed locally. The same hybridist, by crossing Cardinal and Enchanterer, in 1908, produced probably the most popular garden rose both here and in America. This rose is known as Radiance, and is identical with Reliance. The rose is so well known it requires little discussion. A climbing form of Radiance from the South should be justly popular. In 1916 Radiance sported an identical variety in all but colour, and Red Radiance was listed by two Southern firms. Why Radiance should have thrown identical sports in two distinct gardens is a mystery. Just as much a mystery as that surrounding the fact that this same rose sported climbers in two distinct places at about the same time. A climbing sport from the Pacific Rose Company appears in Southern catalogues, whilst in the Oxley garden of Mr. Alfred Marshall a similar climbing sport appeared last year. Some years ago Mr. Marshall met with a similar experience when White Maman Cochet sported a climbing form in his garden, but was anticipated by a similar sport from the South.

The last member of the family, Mrs. C. J. Bell, or shell pink Radiance, originated in 1917 from the nursery of A. N. Pierson, one of the originators of Red Radiance. It has taken a little longer to find its way into commerce in Brisbane, but is a really beautiful rose of a delicate soft salmon colour worthy of a place in any garden.

The trio bears flowers which are identical in shape, being cupped and globular, and for that reason do not find a place among the exhibition roses, although at times they appear in the bud-to-full-bloom class. Of the three, I consider Red Radiance shows the best form, at times claiming attention from the exhibition viewpoint. All three possess a most beautiful and persistant perfume, and all drop their petals as a whole. In vigour I find Red Radiance foremost, with Mrs. C. J. Bell least vigorous, but nevertheless a vigorous rose. The same order is preserved in the case of floriferousness.

Though Red Radiance carries the name indicative of its colour, it is by no means a true red, but rather cerise. I do not think it should be classed as a red rose accordingly. In considering the most popular red rose, there should be no hesitation concerning the premier place. It is justly claimed by Etoile de Holland, sometimes called Star of Holland. I consider this rose, Radiance, and Red Radiance are the foremost trio of garden roses to date. Etoile de Holland stands almost supreme in every rose-growing country in the world. Originating from the Dutch nursery of H. T. Verschuren, in 1919, this rose rapidly became a favourite, and has maintained its premier place ever since. Its popularity can be readily understood when one considers its qualities. Its only fault, to my mind, is a tendency to weak stem, the very large size of the flowers accentuating this. This weakness can be minimised by the use of sulphate of potash scattered around the plant. Some incline to the opinion that this rose is too thin in petalage and lacks substance, but my personal opinion is that therein lies its greatest charm as a garden rose. It lacks the formality of an exhibition rose, but the giant petals, usually half recurved in the case of the outer row, give to the bloom a form and appearance which no amount of rose dressing could improve. The perfume is overpowering, and is described as a damask musk. In colour Etoile de Holland is a rich bright red overlaid with that blackish-crimson hue and velvety sheen so characteristic of the old H.P. reds. Its lasting qualities are exceptional, and as a house decorative it is hard to surpass. This rose is highly prized in England, America, and on the Continent, and stands very high in favour in Queensland.

Its history is interesting. According to the raiser, it is the result of a cross between two well-known reds—Hadley and General Macarthur. Further, General Macarthur, Liberty Richmond, and an unnamed seedling were utilised in producing Hadley. Accordingly, Etoile de Holland is an inbred rose, the more remarkable as it preserves the good points of both parents with just that one fault of weak stem, inherited no doubt from General Macarthur. The colour of Etoile de Holland can be traced as a blend of its two parents, but the tendency to blue so apparent in both parents is a very minor matter with the progeny.

This introduces two more red roses to our notice. With me Hadley is an assured success, and will always find a place in any garden with which I may be concerned. It is a consistant bloomer, giving very full, high pointed, well-shaped roses, though at times confused. The blooms are carried on long, wiry stems held very erect and carrying little foliage. Its perfume is delightful, and its lasting qualities are good, excepting that it is very subject to blueing at certain times. Occasionally also it gives small blooms inclined to be crippled, but its faults are

easily overshadowed by its merits. A climbing form of this red comes into commerce this year, and will be an assured favourite. I am not so keen about General Macarthur. It was first sent out by E. G. Hill in 1905, and at that time readily found a place in public favour. Many of our older rose growers still hold it in high esteem, but I think it must give way to worthier opponents. It opens rather flat, showing the centre rapidly, at times rather small in size, and it blues. A climbing sport of recent introduction, is a rampant grower, though not particularly free in bloom.

Two years after the introduction of General Macarthur, that worthy French firm of hybridists introduced a red rose named Laurent Carle, which remains to-day as a very popular rose. Not a particularly tall grower, yet always doing well, the rose maintains its position in public favour on account of its dark-red colour, sweet, rich perfume, good form and carriage, consistent blooming, and freedom from disease. A recently introduced climbing sport is a worthy addition to the red climbers. I find it the most consistent bloomer among the red climbers. In fact, among all climbers it is an outstanding variety on account of its freedom of bloom. In addition, it is a medium climber, and easily kept within bounds. In 1922 the firm of S. McGredy and Sons sent out a red rose under the name of Lord Charlemont. This rose has each year shown evidence of increasing satisfaction, and will take its place among our best garden roses. I first secured this variety as a novelty, and it never looked back. I received more genuine satisfaction from this particular plant than from any other rose I have ever grown. It gave me dozens of perfectly shaped, long-pointed, rich-glowing crimson blooms with a characteristic veining, its blooms erect on good stems and resisting disease successfully. Although considered by some to be perfumed, I have never detected any perfume of note. This lack of perfume is one of its faults. Had this rose the perfume of Etoile de Holland, I would consider it to be as near to the ideal as possible.

In concluding the discussion of red roses one must not omit our own Star of Queensland. True, it cannot aspire to exhibition honours, but it is a valuable garden rose, of a very dark-red colour, globular in form, and of mixed petalage, with good fragrance. It was introduced in 1909 by Mr. Williams, of Sunnybank, and, if my memory serves me correct, it is a cross from Earl of Dufferin and Etoile de France, and shares many of the characteristics of the latter parent. It is a good grower and disease resistant, and worthy of attention from growers situated under climatic conditions akin to those of Brisbane.

Whilst on this question of local hybridising, I might make mention of Mr. Williams' other success in Penelope. This is a well-known bicoloured rose, but is distinctly temperamental. It is an assured success in some quarters, and a rank failure in other parts. I can never subscribe to the opinion that it even ranks among our best twenty-four roses. This completes the review of the red roses, which I consider claim attention from the present standpoint. I place Etoile de Holland first, Hadley next, Lord Charlemont, Laurent Carle, equal for third place, and then Star of Queensland. Others not reviewed, but worthy of attention, are Hoosier Beauty, Mrs. Henry Winnett, Royal Red, and Sensation.

In dealing with pink roses, no dearth of good garden roses is experienced. I have discussed two already in the Radiance trio. There is no doubt that Radiance ranks very high in favour, and would probably secure premier position as the best pink garden rose. Probably next in favour would be J. J. L. Mock and Madam Abel Chatenay. The former is a rose grown by almost everybody, and probably no show passes without its appearing on the tables. Nevertheless, it is by no means an ideal exhibition variety, for it lacks form and finish. At times it opens into faultless blooms, but is usually inclined to be globular, with the edges of the petals curling over and hiding the centre. Again, it tends towards coarseness. In spite of these faults, and that of little perfume, it maintains a reputation based upon its freedom of bloom and the fine, upright carriage of the blooms on long, straight, solid stems, which are characteristic of the strong, upright growth. I have a tree of this variety 8 feet high but only 18 inches across. This very upright growth makes it possible to grow this variety close together. The fine dual toning of this rose is a conspicuous feature. Shell pink on the inside of the petals contrasts strikingly with solid imperial pink on the reverse. It is a remarkably good rose for internal decoration, as it lasts for a very long period of time. This accounts to a great extent for its popularity. A climbing form now in commerce appears to me to be an extra strong form of the dwarf, and so far does not show vigorous climbing form in my garden.

Madam Abel Chatenay, a well-known salmon-pink rose, is a variety which inclines toward struggling growth and defoliation, but nevertheless it is a fine

garden rose. It carries an abundance of bloom, which, though not particularly good in form, possess an impelling attractiveness with their contrasting colours, silver on inside and deep salmon on the reverse.

Climbing Madam Abel Chatenay is perhaps the most valuable pink climber in vogue. It is always in bloom, and gives hundreds of large fine blooms identical with the dwarf. It is a strong grower, and needs plenty of room for development. I consider both the above roses should find a place in the best twelve. A little more difficulty is experienced when reviewing other pinks. That well-known rose, Columbia, always has a large following. Personally I have never had any very great success with the dwarf variety, though the more recent climbing form is a rose whose growth is difficult to control. The dwarf form is spoken of highly in many quarters, but it suffers from one very serious fault—the blooms are frequently crippled and open into small, misshapen flowers of no value. This is a serious drawback to an otherwise good variety. When good, Columbia is something to dwell upon. Under such conditions it is a faultlessly-shaped, high-pointed, richly-perfumed rose, of a glowing pink, rich and warm, which deepens with age. The blooms keep remarkably well, and the plant is very resistant to disease. This variety hails from the nursery of E. G. Hill, and was put into commerce in 1917. It is a rose that all should grow, for the beautiful flowers with which it rewards its grower at favourable seasons more than compensates for its occasional failures. Each year sports of this variety appear in commerce, among which are found New Columbia, Silver Columbia, Scott's Columbia, Mrs. Warren C. Harding, and Briarcliffe.

KITCHEN GARDEN.

Should showery weather be frequent during July, do not attempt to sow seeds on heavy land, as the latter will be liable to clog, and hence be injurious to the young plants as they come up. The soil should not be reworked until fine weather has lasted sufficiently long to make it friable. In fine weather get the ground ploughed or dug, and let it lie in the rough until required. If harrowed and pulverised before that time, the soil is deprived of the sweetening influences of the sun, rain, air, and frost. When the ground has been properly prepared, make full sowings of cabbage, carrot, broad beans, lettuce, parsnips, beans, radishes, leeks, spring onions, beetroot, eschalots, salsify, &c. As westerly winds may be expected, plenty of hoeing and watering will be required to ensure good crops. Pinch the tops of broad beans which are in flower and stake up peas which require support. Plant out rhubarb, asparagus, and artichokes. In warm districts, it will be quite safe to sow cucumbers, marrows, squashes, and melons during the last week of the month. In colder localities, it is better to wait till the middle or end of August. Get the ground ready for sowing French beans and other spring crops.

RHUBARB.

The continued production of rhubarb may be greatly assisted by giving a heavy mulching of manure and hoeing it well into the soil. Keep the beds well watered, and give regularly a dressing of liquid manure, say, once a week.

It is not necessary to use forcing manures on the young stock, as plants are ruined if forced in the early stages of growth.

The rhubarb makes rapid growth during the autumn and spring, and when stalk cutting has been started liquid manuring and manuring may be given.

LETTUCE CULTURE.

A thin sowing of lettuce seed where the plants are to mature insures not only an earlier crop, but it will be found that the plants grown in this manner are far less likely to run to seed than others transplanted from over-crowded seed-beds.

Lettuce resents checks in all stages of growth, and through inattention in the early stages many losses occur through early seeding. An undisturbed plant may be relied upon to give a good head at least a fortnight or more in advance of others, and for this reason alone it is worth while taking a little extra care in preparing the bed and sowing the seed.

A liberal dressing of manure is always beneficial to this crop, for, in addition to the food value, it retains moisture and keeps the roots cool during the hottest weather. Cow manure is the best, but whatever manure is used should be buried 9 inches below the surface. If it is put in deeper than this, the roots will not reach it until the plant is well developed, and therefore unable to take full advantage of the food provided. Unlike many more delicate plants, the roots of lettuce will penetrate rank manure even when quite small, and grow very rapidly.

Sow lettuce seeds in drills running from north to south. Draw them out with a blunt stick deep enough to allow a scattering of finely-sifted soil being placed in the bottom, and the seed being covered 1 inch deep. This will ensure an early and very even germination. When the seedlings are about 1 inch high, thin out to one plant to every 6 inches of the row. Frequent stirrings of the soil, and an occasional dusting of soot will induce rapid growth, and if, when the plants are half-grown, the surface of the bed is given a dressing of either nitrate of soda or sulphate of ammonia, at the rate of ½ oz. to each yard of row, and lightly forked into the ground, and afterwards well watered in through a fine-rosed can, the plants will readily respond. Good results will follow an application of liquid manure or even soot water.

THE CARE OF THE LAWN.

For a lawn to be a success it must be carefully made in the first place. Good drainage is essential, for stagnant water-logged soil encourages weeds and kills the grass. The soil should be rich in plant food. Give the ground a heavy dressing of good manure, and thoroughly dig it over. Enough time should then be allowed for the soil to settle, as it must be firm when the grass is planted or there will be a series of hills and hollows shortly after. In addition to the manure apply the following mixture at the rate of 3 oz. to the square yard, forking or raking it well into the top spit of the soil:—2 lb. superphosphate of lime, 1 lb. bonemeal, and 1 lb. sulphate of ammonia.

Early in the spring, as the grass begins to grow, a heavy roller should be passed several times over the ground.

Lawns showing bare patches will require a dressing during the autumn, and the mixture previously mentioned will be found very suitable, and will keep the grass well nourished. Wood ashes and soot, combined or not, will also be found beneficial. All dressings should be applied during showery weather. If soil poverty is the cause of a patchy lawn, it is best to rake over in the autumn with a sharp-toothed rake, and dress with a good layer of fine soil and wood ashes.

FLOWER GARDEN.

Winter work ought to be in an advanced state. The roses will not want looking after. They should already have been pruned, and now any shoots which have a tendency to grow in wrong directions should be rubbed off. Overhaul the ferneries, and top-dress with a mixture of sandy loam and leaf mould, staking up some plants and thinning out others. Treat all classes of plants in the same manner as the roses where undesirable shoots appear. All such work as trimming lawns, digging beds, pruning, and planting should now be got well in hand. Plant out antirrhinums, pansies, hollyhocks, verbenas, petunias, &c., which were lately sown. Sow zinnias, amaranthus, balsam, chrysanthemum tricolour, marigold, cosmos, cockscombs, phloxes, sweet peas, lupins, &c. Plant gladiolus, tuberoses, amaryllis, pancratium, ismene, crinums, belladonna lily, and other bulbs. Put away dahlia roots in some warm moist spot, where they will start gently and be ready for planting out in August and September.

Farm Notes for July.

FIELD.—Practically the whole of the work on the land for this month will be confined to the cultivation of winter crops, which should be now making good growth, and to the preparation of land for the large variety of crops which can be sown next month. Early-maturing varieties of wheat may be sown this month. The harvesting of late-sown maize will be nearing completion, and all old stalks should be ploughed in and allowed to rot. Clean up all headlands of weeds and rubbish, and for this purpose nothing equals a good fire. Mangels, swedes, and other root crops should be now well away, and should be ready for thinning out. Frosts, which can be expected almost for a certainty this month, will do much towards ridding the land of insect pests and checking weed growth. Cotton-picking should be now practically finished and the land under preparation for the next crop. The young lucerne should be becoming well established; the first cutting should be made before the plants flower—in fact, as soon as they are strong enough to stand the mowing machine—and the cutting of subsequent crops should be as frequent as the growth and development of the lucerne plants permit. Ordinarily cutting should be regulated to fit in with the early flowering period—i.e., when about one-third of the plants in the crop are in flower.

Orchard Notes for July.

THE COASTAL DISTRICTS.

The marketing of citrus fruits will continue to occupy the attention of growers. The same care in the handling, grading, and packing of the fruit that has been so strongly insisted upon in these monthly notes must be continued if satisfactory returns are to be expected. Despite the advice that has been given over and over again, some growers still fail to grasp the importance of placing their fruit on the market in the best possible condition, and persist in marketing it ungraded; good, blemished, and inferior fruit being met with in the same case. This, to say the least, is very bad business, and as some growers will not take the necessary trouble to grade and pack properly, there is only one thing to do, and that is to insist on the observance of standards of quality and see that the fruit offered for sale complies with the standards prescribed, and that cases are marked accordingly.

Where the crop has been gathered, the trees may be given such winter pruning as may be necessary, such as the removal of broken or diseased limbs or branches, and the pruning of any superfluous wood from the centre of the tree. Where gumming of any kind is seen it should be at once attended to. If at the collar of the tree and attacking the main roots, the earth should be removed from around the trunk and main roots—all diseased wood, bark, and roots should be cut away, and the whole of the exposed parts painted with Bordeaux paste.

When treated do not fill in the soil around the main roots, but allow them to be exposed to the air for some time, as this tends to check any further gumming. When the gum is on the trunk or main limbs of the tree cut away all diseased bark and wood till a healthy growth is met with, and cover the wounds with Bordeaux paste.

If the main limbs are infested with scale insects or attacked by any kind of moss, lichen, or fungus growth, they should be sprayed with lime sulphur.

Towards the end of the month all young trees should be carefully examined for the presence of elephant beetles, which, in addition to eating the leaves and young bark, lay their eggs in the fork of the tree. When the young hatch out they eat their way through to the wood and then work between the wood and the bark, eventually ringbarking one or more of the main limbs, or even the trunk. A dressing of strong lime sulphur to the trunk and fork of the tree, if applied before the beetles lay their eggs, will act as a preventive. In the warmer localities a careful watch should also be kept for the first appearance of any sucking bugs, and to destroy any that may be found. If this is done systematically by all growers the damage done by this pest will be very much reduced.

Citrus trees may be planted throughout the month. Take care to see that the work is done in accordance with the instructions given in the June notes. All worn-out trees should be taken out, provided the root system is too far gone to be renovated, but when the root system is still good the top of the tree should be removed till sound, healthy wood is met with, and the portion left should be painted with a strong solution of lime sulphur. If this is done the tree will make a clean, healthy growth in spring.

The inclusion of a wide range of varieties in citrus orchards—and which has been the general practice—is to be deprecated. Even in new plantations there is a tendency to follow the same unprofitable lines. Far too much consideration is given to the vendor's description or the purchaser's appreciation of a particular variety or varieties. Individual tastes must be subordinated to market requirements, and the selection of varieties to the best available kind of early, medium, and late fruits. Amongst oranges Joppa should be placed first, Sabina for early fruit, and Valencia or Loon Giru Gong for late markets.

In mandarins local conditions influence several varieties, and since the introduction of the fungus known as "scab" the inclusion, particularly on volcanic soil, of the Glen Retreat and Emperor types is risky. In alluvial lands, Emperor and Sovereign (an improved Glen Retreat) are the most profitable, though Scarlet in many places is worth including, with King of Siam as a late fruit.

Land intended for bananas and pineapples may be got ready, and existing plantations should be kept in a well-cultivated condition so as to retain moisture in the soil.

Bananas intended for Southern markets may be allowed to become fully developed, but not coloured, as they carry well during the colder months of the year, unless they meet with a very cold spell when passing through the New England district of New South Wales.

The winter crop of smoothleaf pines will commence to ripen towards the end of the month, and when free from blackheart (the result of a cold winter) or from fruitlet core rot, they are good for canning, as they are of firm texture and stand handling. Where there is any danger of frost or even of cold winds, it pays to cover pines and also the bunches of bananas. Bush hay is used for the former and sacking for the latter.

Strawberries should be plentiful during the month, provided the weather is suitable to their development, but if there is an insufficient rainfall, then irrigation is required to produce a crop. Strawberries, like all other fruits, pay well for careful handling, grading, and packing; well-packed boxes always realising a much higher price than indifferently packed ones on the local market. Where strawberries show signs of leaf blight or mildew, spray with Bordeaux mixture for the former and with sulphide of soda for the latter.

When custard apples fail to ripen when gathered, try the effect of placing them in the banana-ripening rooms, and they will soon soften instead of turning black.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

July is a busy month for the growers of deciduous fruits, as the important work of winter pruning should, if possible, be completed before the end of the month, so as to give plenty of time for spraying and getting the orchard into proper trim before the spring growth starts.

In pruning, follow the advice given in the May number; and if you are not thoroughly conversant with the work, get the advice of one of the Departmental officers stationed in the district.

Pruning is one of the most important orchard operations, as the following and succeeding seasons' crops depend very largely on the manner in which it is carried out. It regulates the growth as well as the number and size of the fruit, as if too much bearing wood is left, there is a chance of the tree setting many more fruits than it can properly mature, with a result that unless it is rigorously thinned out it is undersized and unsaleable. On the other hand, it is not advisable to unduly reduce the quantity of bearing wood, or a small crop of overgrown fruit may be the result.

Apples, pears, and European varieties of plums produce their fruits on spurs that are formed on wood of two-years' growth or more; apricots and Japanese plums on new growth and on spurs; but peaches and nectarines always on wood of the previous season's growth. Once peachwood has fruited it will not produce any more from the same season's wood, though it may develop spurs having a new growth or new laterals which will produce fruit.

The pruning of the peaches and nectarines, therefore, necessitates the leaving of sufficient new wood on the tree each season to carry a full crop, as well as the leaving of buds from which to grow new wood for the succeeding year's crop. In other words, one not only prunes for the immediately succeeding crop, but also for that of the following season.

All prunings should be gathered and burnt, as any disease that may be on the wood is thoroughly destroyed. When pruned, the trees are ready for their winter spraying with lime-sulphur.

All kinds of deciduous trees may be planted during the month provided the ground is in a proper state to plant them. If not, it is better to delay planting until August, and carry out the necessary work in the interval. The preparation of new land for planting may be continued, although it is somewhat late in the season, as new land is always the better for being given a chance to mellow and sweeten before being planted. Do not prune vines yet on the Granite Belt; they can, however, be pruned on the Downs and in the western districts.

Trees of all kinds, including citrus, can also be planted in suitable situations on the Downs and western districts, and the pruning of deciduous trees should be concluded there. If the winter has been very dry, and the soil is badly in need of moisture, all orchards in the western districts, after being pruned and ploughed, should receive a thorough irrigation (where water is available) about the end of the month, so as to provide moisture for the use of the trees when they start growth. Irrigation should be followed by a thorough cultivation of the land to conserve the water so applied. As frequently mentioned in these notes, irrigation and cultivation must go hand in hand if the best results are to be obtained, especially in our hot and dry districts.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

	June, 1929.		July, 1929.		MOONRISE. June, 1929.	MOONRISE. July 1929.
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
					a.m.	a.m.
1	6.39	5.0	6.47	5.5	...	12.18
2	6.39	5 0	6.47	5.5	12.25	1.18
3	6.40	5.0	6.47	5.5	1.31	2.22
4	6.40	5.0	6.47	5.6	2.31	3 30
5	6.41	5.0	6.47	5.6	3.34	4.39
6	6.41	5.0	6.47	5.6	4.42	5.49
7	6.42	5.0	6.47	5.7	5.54	6.58
8	6.42	5.0	6.47	5.7	7.5	8.0
9	6.42	5.0	6.46	5.7	8.14	8 51
10	6.42	5.0	6.46	5.8	9.18	9.35
11	6.42	5.0	6.46	5.8	10.14	10.12
12	6.43	5.0	6 46	5.8	11.1	10.58
13	6.43	5.0	6.46	5.9	11.39	11.17
					p.m.	
14	6.43	5.0	6.46	5.9	12.13	11.47
						p.m.
15	6.43	5.0	6.46	5.9	12.44	12.18
16	6.44	5.0	6.46	5.10	1.15	12.51
17	6.44	5.0	6 45	5 10	1.44	1.27
18	6.44	5.1	6.45	5.11	2.15	2.7
19	6.45	5.1	6 44	5.11	2.51	2.54
20	6.45	5.1	6.44	5.12	3.27	3.44
21	6.45	5.1	6.43	5.12	4.10	4.37
22	6.46	5.2	6.43	5.13	4.57	5.31
23	6.46	5.2	6.42	5.13	5.49	6.27
24	6.46	5.2	6.42	5.14	6.42	7.25
25	6.46	5.3	6.41	5.14	7.36	8.18
26	6.46	5.3	6.41	5.15	8.33	9.15
27	6.46	5.3	6.40	5.15	9.28	10.11
28	6.46	5.4	6.40	5.16	10.24	11.10
29	6.46	5.4	6.39	5.16	11.20	...
					a.m.	a.m.
30	6.46	5.4	6.39	5.17	12.18	12.9
31			6.38	5.18		1.14

Phases of the Moon, Occultations, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania.

7 June	● New Moon	11 56	p.m.
14 ,,	☾ First Quarter	3 14	p.m.
22 ,,	○ Full Moon	2 15	p.m.
30 ,,	☽ Last Quarter	1 53	p.m.

Perigee, 8th June, at 1.30 p.m.
Apogee, 22nd June, at 10.54 p.m.

The occultation of Jupiter by the Moon about 5 hours after sunset will be invisible.

The planet Neptune, which has appeared to be remarkably close to Regulus, the brightest star in Leo, for some months past, will appear to be still closer on the 6th. The apparent distance between the planet and the star will very gradually increase after that date. On the 12th the Moon will pass 5 degrees below the planet and Regulus at 6 p.m., and, being still young, will permit the bright star to be noticed, thus forming a good indicator of that notable star's position.

The conjunction with the Moon of Jupiter on the 6th and of Mercury on the 7th will be invisible on account of their apparent nearness to the Sun. Mercury will pass about 3 degrees above the Sun from east to west on the 9th. Saturn will be in opposition to the Sun on the 18th, that is, it will rise as the Sun sets and set when the Sun rises.

The Australian winter solstice will occur on the 22nd when the Sun will reach its greatest northern latitude, the Tropic of Cancer, after which it will again slowly return southward.

Venus will be at its greatest elongation, 46 degrees west, on the 22nd. It will then be halfway between the eastern horizon and the zenith at the time of sunrise.

The principal constellations visible in June will be Leo, Virgo, Libra, Scorpio, and Sagittarius. Orion will set with the Sun on the 15th, while Scorpio will be hanging over the eastern horizon in double S-like curves, and at 11 p.m. will be immediately overhead at Brisbane, Toowoomba, and Warwick.

The Southern Cross on the 15th will be upright at 7 p.m., and in a horizontal position at 1 a.m., when it will be at its greatest distance (30 degrees) west of the south celestial pole.

7 July	● New Moon	6 47	a.m.
14 ,,	☾ First Quarter	2 5	a.m.
22 ,,	○ Full Moon	5 20	p.m.
29 ,,	☽ Last Quarter	10 55	a.m.

Perigee, 6th July, at 11.0 p.m.
Apogee, 20th July, at 2·24 a.m.

Mercury, on the 3rd, is a morning star, apparently amongst those of Taurus, rising an hour and 48 minutes before the Sun, the nearest stars of any magnitude being Beta Tauri to the north-east and Aldebaran about the same distance to the west.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]